



PATENT
Docket No. 58328US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant(s): Leigh E. WOOD et al.)	Group Art Unit:	3677
)		
Serial No.: 10/674,174)	Examiner:	Ruth C. Rodriguez
Confirmation No.: 1946)		
)		
Filed: September 29, 2003)		
)		
For:		CLOSURE SYSTEM AND METHOD OF MANUFACTURE	

APPEAL BRIEF

Commissioner for Patents
Mail Stop Appeal Brief - Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Brief is presented in support of the Appeal filed February 12, 2007, from the final rejection of claims 1-3, 7-15, and 29-44 of the above-identified application under 37 C.F.R. §§1.113 and 1.191.

This Brief is being submitted as set forth in 37 C.F.R. § 41.37. Please charge Deposit Account No. 13-4895 the fee for filing this Brief under 37 C.F.R. § 41.20(b)(2).

I. REAL PARTY IN INTEREST

The real party in interest of the above-identified patent application is the assignee, 3M Innovative Properties Company, as evidenced by the assignment recorded at Reel 014573, Frame 0180 on 29 September 2003.

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II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellants' Representatives which would directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-22 were filed in this application. Claims 4-6 and 16-28 were canceled and claims 29-43 were added in the Amendment and Response filed by Appellants on 17 October 2005. Claim 44 was added in the Amendment and Response filed by Appellants on 17 July 2006. Thus, Claims 1-3, 7-15, and 29-44 are pending and are the subject of this appeal (see Claim Appendix).

IV. STATUS OF AMENDMENTS

No claim amendments have been filed since issuance of the Final Rejection mailed 10 October 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

With reference to Figures 1 & 2, one embodiment of the invention as recited in independent claim 1 is a closure system that includes a base tab (10) having an outer edge (14) and first (11) and second (12) major surfaces; a carrier tab (20) having first (21) and second (22) major surfaces, an inner edge (23), and an opposing outer edge (24), the inner edge (23) and the outer edge (24) defining a length of the carrier tab (20); a fastener component (40) attached to at least one of the first (21) and second (22) major surfaces of the carrier tab (20); an overlap region (18) in which a portion of the first major surface (21) of the carrier tab (20) faces the second major surface (12) of the base tab (10) such that the outer edge (14) of the base tab (10) is located

between the inner (23) and outer (24) edges of the carrier tab (20); and bonding tape (30) adhesively positioned and welded to the second major surface (12) of the base tab (10) adjacent the overlap region (18), the bonding tape (30) further adhesively attached and welded to the second major surface (22) of the carrier tab (20) within the overlap region (18), wherein the inner edge (23) of the carrier tab (20) is located between the bonding tape (30) and the second major surface (12) of the base tab (10). *See, e.g.*, Specification, page 2, lines 11-21; page 6, lines 25-32; and page 7, lines 15-30.

A further embodiment of the invention, in accordance with independent claim 15, provides a closure system that includes an elastic base tab (10) having an outer edge and first and second major surfaces; a carrier tab (20) having first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab, wherein the carrier tab is inelastic; a fastener component (40) attached to at least one of the first and second major surfaces of the carrier tab (20); an overlap region (18) in which a portion of the first major surface (21) of the carrier tab (20) faces the second major surface (12) of the elastic base tab (10) such that the outer edge (14) of the elastic base tab (10) is located between the inner (23) and outer (24) edges of the carrier tab (20); and a bonding tape (30) adhesively positioned and welded to the second major surface (12) of the elastic base tab (10) adjacent the overlap region (18), the bonding tape (30) further adhesively attached and welded to the second major surface (22) of the carrier tab (20) within the overlap region (18), wherein the inner edge (23) of the carrier tab (20) is located between the bonding tape (30) and the second major surface (12) of the elastic base tab (10), and further wherein the bonding tape (30) is inelastic. *See, e.g.*, Figures 1 & 2 along with the Specification at page 2, line 22 to page 3, line 2; page 4, line 31 to page 5, line 6; page 6, lines 25-32; and page 7, lines 15-30.

Another embodiment of the invention is recited in independent claim 31. This claim recites a closure system including a base tab (10) having an outer edge and first and second major

surfaces, wherein at least a portion of the base tab exhibits elasticity; a carrier tab (20) having first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab; a fastener component (40) attached to at least one of the first (21) and second (22) major surfaces of the carrier tab (20); an overlap region (18) in which a portion of the first major surface (21) of the carrier tab (20) faces the second major surface (12) of the base tab (10) such that the outer edge (14) of the base tab (10) is located between the inner (23) and outer (24) edges of the carrier tab (20), wherein the first major surface (21) of the carrier tab (20) and the second major surface (12) of the base tab (10) are not attached to each other within the overlap region (18); and bonding tape (30) attached to the second major surface (12) of the base tab (10) adjacent the overlap region (18), the bonding tape (30) further attached to the second major surface (22) of the carrier tab (20) within the overlap region (18), wherein the inner edge (23) of the carrier tab (20) is located between the bonding tape (30) and the second major surface (12) of the base tab (10). *See, e.g.*, Figures 1 & 2, along with the Specification at page 2, line 22 to page 3, line 2; page 4, line 31 to page 5, line 6; page 6, lines 25-32; page 7, lines 15-30; and page 8, lines 22-28.

Yet another embodiment of the invention is recited in independent claim 43. This embodiment is a closure system including an elastic base tab (10) having an outer edge (14) and first (11) and second (12) major surfaces; a carrier tab (20) having first (21) and second (22) major surfaces, an inner edge (23), and an opposing outer edge (24), the inner edge (23) and the outer edge (24) defining a length of the carrier tab (20), wherein the carrier tab (20) is inelastic; a fastener component (40) attached to at least one of the first (21) and second (22) major surfaces of the carrier tab (20); an overlap region (18) in which a portion of the first major surface (21) of the carrier tab (20) faces the second major surface (12) of the elastic base tab (10) such that the outer edge (14) of the elastic base tab (10) is located between the inner (23) and outer (24) edges of the carrier tab (20), wherein the first major surface (21) of the carrier tab (20) and the second

major surface (12) of the base tab (10) are not attached to each other within the overlap region (18); and a bonding tape (30) attached to the second major surface (22) of the carrier tab (20) within the overlap region (18), wherein the inner edge (23) of the carrier tab (20) is located between the bonding tape (30) and the second major surface (12) of the elastic base tab (10), and further wherein the bonding tape (30) is inelastic. *See, e.g.*, Figures 1 & 2, along with the Specification at page 2, line 22 to page 3, line 2; page 4, line 31 to page 5, line 6; page 6, lines 25-32; page 7, lines 15-30; and page 8, lines 22-28.

A still further embodiment of the invention is provided in independent claim 44. This claim recites a closure system that includes a base tab (10) having an outer edge (14) and first (11) and second (12) major surfaces; a carrier tab (20) having first (21) and second (22) major surfaces, an inner edge (23), and an opposing outer edge (24), the inner edge (23) and the outer edge (24) defining a length of the carrier tab (20); a fastener component (40) attached to at least one of the first (21) and second (22) major surfaces of the carrier tab (20); an overlap region (18) in which a portion of the first major surface (21) of the carrier tab (20) faces the second major surface (12) of the base tab (10) such that the outer edge (14) of the base tab (10) is located between the inner (23) and outer (24) edges of the carrier tab (20); and bonding tape (30) adhesively attached and welded to the second major surface (12) of the base tab (10) adjacent the overlap region (18), the bonding tape (30) further adhesively attached and welded to the second major surface (22) of the carrier tab (20) within the overlap region (18), wherein the inner edge (23) of the carrier tab (20) is located between the bonding tape (30) and the second major surface (12) of the base tab (10), wherein the bonding tape (30) is welded using a welding technique selected from the group consisting of chemical welding, dynamic mechanical welding, and combinations thereof. *See, e.g.*, Figures 1 & 2, along with the Specification at page 2, lines 11-21; page 6, lines 25-32; and page 7, lines 15-30; and page 8, lines 22-28.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.

Claims 1-3, 7-15, and 29-44 stand rejected under 35 U.S.C. §103(a) as being unpatentable over European Patent Document EP 0 669 121 A1 in view of U.S. Patent No. 5,656,111.

VII. ARGUMENT

Claims 1-3, 7-15, and 29-44 are patentable under 35 U.S.C. §103(a) over European Patent Document EP 0 669 121 A1 in view of U.S. Patent No. 5,656,111.

To support a *prima facie* case of obviousness, the Examiner must establish that there is a motivation to combine the cited documents (or modify the teachings of a document) to achieve the claimed invention, with a reasonable expectation of success. Further, the references must teach or suggest every element of the claimed invention. *See* M.P.E.P. § 2143. For at least the reasons set forth below, it is respectfully submitted that the Examiner has failed to make the requisite showing of a *prima facie* case of obviousness over European Patent Document EP 0 669 121 (hereinafter “EP ‘121”) in view of U.S. Patent No. 5,656,111 (hereinafter “Dilnik et al.”).

EP ‘121 teaches a method of forming a plurality of adhesive fastener assemblies that includes attaching a web of stiffening material to a substrate web to form a substrate composite (EP ‘121, abstract). Dilnik et al. teach a fastening tape for use on a disposable garment and a manufacturing process therefore. The tape includes a first substrate and an interlocking material attached to the first substrate.

In support of this rejection, it is asserted that EP ‘121 teaches all of the elements of claims 1-3, 7-15 and 29-44 with the exception of a combination of adhesive and welded bonds. Dilnik et al. is cited in combination with EP ‘121 because it assertedly teaches the use of adhesive and welded bonds in conjunction with each other. Appellants respectfully disagree and submit that the proposed combination of EP ‘121 and Dilnik et al. does not support a case of *prima facie*

obviousness with respect to claims 1-3, 7-15, and 29-44 as discussed below. Review and reversal of this rejection by the Board are, therefore, respectfully requested.

- A. *Claims 29-43:* EP '121 and Dilnik et al. do not teach or suggest a closure system wherein the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region as recited in claims 29-43.

Claims 29-43 recite closure systems that differ from other closure systems because they do not include a conventional "Y-bond" as is known in the art. Although it is asserted that EP '121 discloses the closure systems recited in claims 29-43, Appellants submit that EP '121, however, discloses only a conventional "Y-bond". Furthermore, Dilnik et al. (cited in combination with EP '121) does not address the shortcomings of EP '121 with respect to these features. As a result, a *prima facie* case of obviousness has not been established with respect to claims 29-43. Review and reversal of the obviousness rejection as applied to claims 29-43 are, therefore, respectfully requested.

One exemplary embodiment of the closure system recited in claims 29-43 is depicted in Figure 1 of the present application. Appellants will describe the closure systems recited in claims 29-43 with reference to that exemplary embodiment to assist the Board in understanding the inventions recited in claims 29-43, but it should be understood that the claimed invention is not to be limited to the specific embodiment depicted in Figure 1. The closure system depicted in Figure 1 includes a base tab 10 and a carrier tab 20 that are attached to each other by a bonding tape 30. The base tab 10 and the carrier tab 20 overlap each other within an overlap region 18, but the first major surface 21 of the carrier tab 20 is not attached to the second major surface 12 of the base tab 10 within the overlap region 18. If the recited construction were a conventional "Y-bond" assembly, both the bonding tape 30 and the base tab 10 would be attached to the carrier

tab 20. The construction is not, however, a conventional "Y-bond" because one of the arms (i.e., the base tab 10) is not attached to the base of the "Y" (i.e., the carrier tab 20).

In contrast to the construction described in claims 29-43, EP '121 does teach a conventional Y-bond assembly in which two arms are attached the base of the "Y". Referring for example, to the description at col. 22, line 27 to col. 24, line 14 of EP '121 (and corresponding Figures 2-3), the disclosed fastener system includes a tape substrate member 48 ("carrier tab 20") attached to a side panel 90 ("base tab 10"). The assembly depicted in Figure 3 includes a release tape 74 ("bonding tape 30") that overlaps and is adhesively bonded to the tape substrate member 48. *See, e.g., EP '121*, col. 24, lines 1-6. Both the side panel 90 (base tab) and the release tape 74 (bonding tape) are attached to the substrate member 48 (carrier tab) in the disclosed Y-bond. In other words, the element that corresponds to the base tab (side panel 90) is attached to the element that corresponds to the carrier tab (substrate member 48) in the region in which those two elements overlap to form a conventional Y-bond. That is in direct contrast with the closure assemblies recited in claims 29-43 – closure assemblies in which the base tab and the carrier tab are not directly attached to each other within the region in which they overlap.

As support for the position that EP '121 discloses assemblies that do not include conventional Y-bonds, the Examiner has asserted that the side panel 90 (base tab) and the substrate member 48 (carrier tab) are not explicitly described as being attached to each other in EP '121. Appellants respectfully disagree.

EP '121 teaches (in connection with Figures 2 & 3) that "[i]n a particular embodiment of the invention, a terminal end portion of release tape 74 may optionally overlap and adhesively bond to an intermediate section of substrate member 48 along a bond region which traverses across the length of the substrate member. The resultant interconnection between substrate member 48 and release tape 74 provides for a Y-bond which can strengthen the assembly and

attachment of tape fastener 44 to the section of diaper 20 that is clamped between release tape 74 and factory-bond region 50 of tape substrate member 48.” (EP ‘121, column 24, lines 1-12).

The description of the bond between the release tape 74 (bonding tape), the side panel 90 (base tab), and the substrate member 48 (carrier tab) as a “Y” bond in EP ‘121 presumes that the three elements are bonded together in a Y-bond formation. If the side panel 90 (base tab) and the substrate member 48 (carrier tab) were not attached to each other, then the release tape 74 (bonding tape), the side panel 90 (base tab), and the substrate member 48 (carrier tab) would not create a Y-bond when positioned according to Figure 3 of EP ‘121.

Furthermore, EP ‘121 states that the Y-bond can “*strengthen the assembly and attachment* of tape fastener 44 to the section of diaper 20 . . .” That is, the Y-bond augments (e.g., strengthens) the assembly and attachment that is already present in the article. Thus, any assertion that an attachment between the side panel 90 (base tab) and the substrate member 48 (carrier tab) in EP ‘121 is not necessary because the release tape 74 (bonding tape) joins the side panel 90 (base tab) and the substrate member 48 (carrier tab) is not supported by the reference itself. In other words, EP ‘121 does not teach or suggest that the substrate member 48 is not attached to the side panel 90 in any embodiment of the constructions disclosed in EP ‘121.

As further support for Appellants' position that EP ‘121 teaches that the substrate member 48 (carrier tab) is attached to the side panel 90 (base tab), it must be noted that EP ‘121 teaches that the release tape 74 (bonding tape) may be provided as a place to attach an adhesive fastener prior to its use by a consumer. *See, e.g.,* EP ‘121, column 23, lines 31-57. As discussed in the first sentence of column 24, the “release tape 74 may optionally overlap and adhesively bond to an intermediate section of substrate member 48 along a bond region which traverses across the length of the substrate member.” In other words, the release tape 74 might overlap and be adhesively bonded to the substrate member 48 -- or it might not. In those instances where the release tape 74 does not overlap with and attach to the substrate member 48, the substrate

member 48 must be attached to the side panel 90 or the fastener 50 will not be attached to the diaper.

Any assertion, therefore, that the substrate member 48 is not attached directly to the side panel 90 (in the absence of the optionally overlapping release tape 74) cannot be supported because such a construction would result in a non-functional assembly in those instances where the release tape 74 does not overlap and bond with the substrate member 48. The assembly would be non-functional because the substrate member 48 would not be attached to the side panel 90 and the release tape 74 does not overlap and attach to the substrate member 48. As a result, such a modification would violate one or both of the tenets that a proposed modification cannot render the prior art unsatisfactory for its intended purpose (*see, e.g.*, MPEP § 2143.01(V), p. 2100-129, 8th Ed., Rev 5 (August 2006) (citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984))) and that a proposed modification cannot change the principle of operation of a reference (*see, e.g.*, MPEP § 2143.01(VI), p. 2100-130, 8th Ed., Rev 5 (August 2006) (citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA1959))).

Also in support of this rejection, the Examiner asserted in the Final Office Action (mailed 10 October 2006, at page 4, lines 6-7) that EP '121 discloses a closure system wherein "[n]o adhesive is located between the first major surface of the carrier tab and the second major surface of the base tab within the overlap region (Fig 3)." Appellants respectfully submit that the presence or absence of adhesive in that location is not dispositive on the issue as to whether or not the side panel 90 (base tab) and the substrate member 48 (carrier tab) are attached to each other within the region in which they overlap. In particular, EP '121 discloses a variety of techniques for attaching different components that do not require adhesive at, e.g., col. 9, lines 54-58 and col. 13, lines 26-30. As a result, the mere absence of adhesive does not provide evidence that the carrier tab and the base tab are not connected to each other within the overlap region in the constructions of EP '121 as asserted in support of this rejection.

As discussed herein, EP '121 does not teach or suggest the elements recited in claims 29-43. Appellants also submit that Dilnik et al. does not remedy the basic deficiencies of EP '121 nor is any assertion made that it does. Thus, in view of the foregoing comments, neither reference, taken either separately or together, provide sufficient basis for a case of *prima facie* obviousness of Appellants' invention as recited in claims 29-43.

Review and reversal of this obviousness rejection as applied to claims 29-43 are, therefore, respectfully requested.

B. Claims 1-3, 7-15 & 29-30: Neither EP '121 nor Dilnik et al. teach a bonding tape adhesively positioned and welded to the second major surface of the base tab adjacent the overlap region as recited in claims 1-3, 7-15 & 29-30.

Independent claims 1 and 15 each recite a closure system wherein, *inter alia*, bonding tape is adhesively positioned and welded to the second major surface of the base tab. One exemplary embodiment of the invention of claims 1 and 15 is described in the specification at page 7, lines 25-27 and the invention of those claims will be described with reference to that exemplary embodiment.

In the described embodiment, a layer of adhesive provides "a positioning bond to position the base tab 10, carrier tab 20 and bonding tape 30 in the manufacturing process until the bonding tape 30 can be welded into place." That is, the adhesive is provided merely to hold the bonding tape in position until the weld providing the attachment can be made. The weld provides permanent attachment of the bonding tape to the base tab and carrier tab. However, the adhesive that provides the positioning bond does not necessarily play a significant part in permanent attachment of the bonding tape to the base tab and the carrier tab.

Dilnik et al., in contrast, provides an article that includes an area of substrates and interlocking hook and loop fastening material that may be attached to each other by both

adhesive layer and thermal bond. Both of the attachment means (adhesive and thermal bonds) play a role in attaching the substrates and fastener, with the area of thermal bond being limited such that, e.g., the functionality of as few hooks as possible is destroyed (Dilnik et al., col. 7, line 30 to col. 8, line 32). For example, Dilnik et al. teach that the thermal bond may cover from about 1 to about 20 percent of the bond area (Dilnik et al., col. 8, lines 16-20). Thus, the adhesive bond must necessarily provide attachment of at least the balance of the bond area (e.g., at least about 80% of the bond area).

As a result, Appellants respectfully submit that one skilled in the art would not be motivated to use the attachment means of Dilnik et al., which provides attachment of the substrates using an adhesive bond covering between 80 percent and 99 percent of the bond area, to provide the closure system of Appellants' claims 1-3, 7-15 & 29-30, which recite bonding tape adhesively positioned and welded to the second major surface of the base tab adjacent the overlap region.

Although the Examiner has asserted that there is a motivation to combine the references as proposed in support of the rejection of claims 1-3, 7-15 & 29-30, no reasoning has been presented to show motivation for the combination of the teachings of EP '121 with those of Dilnik et al.

In order to establish a *prima facie* case of obviousness, however, the Examiner must identify the motivation for combining references in the references themselves as a whole, or in the prior art, and not in Appellants' disclosure. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81, 93 (Fed. Cir. 1986) ("Focusing on the obviousness of substitutions and differences instead of on the invention as a whole, . . . was a legally improper way to simplify the difficult determination of obviousness."). One cannot "simply [to] engage in a hindsight reconstruction of the claimed invention, using the Appellant's structure as a template and selecting elements from references to fill the gaps." *In re Gorman*, 933 F.2d 982, 18

U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991). For at least the reasons discussed, *infra*, Appellants assert that the cited art does not suggest the combination of their teachings, nor is a reasonable likelihood that such a combination would result in the present invention provided.

Among the assertions made in support of the rejection of claims 1-3, 7-15 & 29-30, it was asserted that “Dilnik is being used for the teaching that the use of both systems being used together to join the carrier tab to the base tab is known in the art” (Final Office Action mailed 10 October 2006, page 6, lines 15-17). However, the mere showing that using the two attachment means together is known does not, itself, provide motivation for using the attachment means of Dilnik et al. to provide the closure system of Appellants’ claims 1-3, 7-15 & 29-30. Rather, the Examiner must provide some reasoning to support the assertion that one of ordinary skill in the art would use the two attachment means as recited in claims 1-3, 7-15 & 29-30.

Another assertion made in support of the rejection of claims 1-3, 7-15 & 29-30 is that “Dilnik also teaches an advantage for using both systems together since they provides [*sic*] good shear adhesion and good peel adhesion that is being used as the motivation for making the combination between EP ‘121 and Dilnik” (Final Office Action mailed 10 October 2006, page 6, lines 17-19).

Appellants respectfully point out, however, that there is no suggestion in EP ‘121 that the attachment means disclosed therein are at all deficient in shear adhesion and peel adhesion, or that it would be desirable for the invention disclosed in EP ‘121 to use an attachment method having improved shear adhesion and peel adhesion. Appellants, instead, contend that the Examiner used impermissible hindsight reasoning to combine the teachings of EP ‘121 with those of Dilnik et al. that provide an area of substrates and fastening material that may be attached to each other by both adhesive layer and thermal bond.

In view of the foregoing discussion, Appellants respectfully submit that Dilnik et al. teach a system of adhesive and thermal bonding wherein both the adhesive layer and the thermal bond

are relied upon for attachment of the article. Thus, Appellants respectfully assert that Dilnik et al. do not provide the closure system including bonding tape adhesively positioned and welded to the base tab and carrier tab, as recited in Appellants' claims 1 and 15, as well as in claims 2, 3, and 7-14 which are dependent upon claim 1. Furthermore, since the systems of Dilnik et al. that include both adhesive and thermal bonds depend on both the adhesive and the thermal bond for attachment of the item, and particularly since the thermal bonds are used on at most 20% of the bond area, the skilled person would not be motivated to modify the teachings of Dilnik et al. to provide Appellants' adhesively positioned bonding tape.

For at least the reasons presented above, Appellants respectfully submit that a *prima facie* case of obviousness has not been established with respect to claims 1-3, 7-15 & 29-30 over EP '121 in view Dilnik et al. Review and reversal of the obviousness rejection as applied to claims 1-3 & 7-15 are, therefore, respectfully requested.

C. *Claim 44:* Use of the welding techniques recited in claim 44 imparts patentability over the cited art and is entitled to patentable weight requiring reversal of the obviousness rejection as applied to claim 44.

The Examiner asserted in the Final Office Action mailed 10 October 2006 (page 7, lines 20-22) that "the method of forming the device is not germane to the issue of patentability of the device itself" and that this limitation was not given patentable weight. In the Advisory Action mailed 6 February 2007, page 2, lines 15-19, the Examiner stated that "the claim is an article claim directed to a closure system and the claim only requires that the bonding tape is adhesively attached and welded to the second major surface of the base tab. The limitation in question is considered a method limitation and method limitations do not have patentable weight." Appellants earnestly disagree.

In order to assess patentability of a claim, the claim must be read as a whole. (*In re Gulack*, 217 USPQ 401, 403 (Fed. Cir. 1983), stating, "[u]nder section 103, the board cannot

dissect a claim, excise the printed matter from it, and declare the remaining portion of the mutilated claim to be unpatentable. The claim must be read as a whole.”).

Claim 44 recites a closure system that includes:

bonding tape adhesively attached and welded to the second major surface of the base tab adjacent the overlap region, the bonding tape further adhesively attached and welded to the second major surface of the carrier tab within the overlap region, . . . wherein the bonding tape is welded using a welding technique selected from the group consisting of chemical welding, dynamic mechanical welding, and combinations thereof.

That is, claim 44, read as a whole, provides bonding tape adhesively attached and welded to the base tab and to the carrier tab, wherein *the weld* is provided by a welding technique selected from the group of chemical welding, dynamic mechanical welding, and combinations thereof. It is the type of weld provided that distinguishes over the prior art, wherein the type of weld is described by how the weld is obtained.

Dilnik et al., teach attachment “by hot or cold melt adhesives, thermal bonding (including ultrasonic bonding), sewing, combinations of these methods and the like.” (Dilnik et al., col. 6, lines 18-21). Furthermore, the only combination specifically disclosed is using “both adhesive and thermal bonds” (Dilnik et al., col. 6, lines 21-23 and col. 7, lines 32-37). Dilnik et al. fail to teach a bonding tape adhesively attached and welded to a base tab and to a carrier tab, wherein the weld is provided by chemical welding, dynamic mechanical welding, and combinations thereof. Notably, Dilnik et al. fail to teach chemical welding or dynamic mechanical welding at all.

As a result, EP ‘121 in view of Dilnik et al. cannot support a *prima facie* case of obviousness with respect to claim 44.

Furthermore, in view of the foregoing comments, Appellants assert that provision of a weld by chemical welding, dynamic mechanical welding, and combinations thereof imparts

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patentability of claim 44 over the cited art. Thus, this feature of the claim is entitled to patentable weight, and the claim is patentable over the cited art.

Review and reversal of the obviousness rejection as applied to claim 44 are, therefore, respectfully requested.

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VIII. SUMMARY

For at least the foregoing reasons, Appellants respectfully request that the Board review and reverse the obviousness rejection of claims 1-3, 7-15, and 29-44 in view of EP '121 and Dilnik et al. as discussed herein and that notification of the allowance of these claims be issued.

Respectfully submitted by

Mueting, Raasch & Gebhardt, P.A.
P.O. Box 581415
Minneapolis, MN 55458-1415
(612)305-1220

12 JUNE 2007
Date

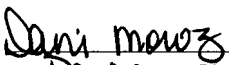
By: 
Kevin W. Raasch
Reg. No. 35,651
Direct Dial: (612) 305-1218

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By: 
Name: Dani Moroz

CLAIMS APPENDIX

Serial No.: 10/674,174

Docket No.: 58328US002

Pending claims 1-3, 7-15, and 29-44 are provided below.

1. A closure system comprising:

a base tab comprising an outer edge and first and second major surfaces;

a carrier tab comprising first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab;

a fastener component attached to at least one of the first and second major surfaces of the carrier tab;

an overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the base tab such that the outer edge of the base tab is located between the inner and outer edges of the carrier tab; and

bonding tape adhesively positioned and welded to the second major surface of the base tab adjacent the overlap region, the bonding tape further adhesively attached and welded to the second major surface of the carrier tab within the overlap region, wherein the inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab.

2. A closure system according to claim 1, wherein no adhesive is located between the first major surface of the carrier tab and the second major surface of the base tab within the overlap region.

3. A closure system according to claim 1, wherein at least a portion of the base tab exhibits elasticity.
7. A closure system according to claim 1, wherein the bonding tape comprises a layer of pressure sensitive adhesive facing the base tab and the carrier tab.
8. A closure system according to claim 1, wherein the carrier tab is inelastic.
9. A closure system according to claim 1, wherein the bonding tape is inelastic.
10. A closure system according to claim 1, wherein the base tab comprises an integral portion of a disposable garment.
11. A closure system according to claim 1, wherein the fastener component is adhesively attached to the carrier tab.
12. A closure system according to claim 1, wherein the fastener component comprises a mechanical fastener component.

13. A closure system according to claim 1, wherein the bonding tape is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tab.

14. A closure system according to claim 1, wherein the fastener component is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tab.

15. A closure system comprising:

an elastic base tab comprising an outer edge and first and second major surfaces;

a carrier tab comprising first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab, wherein the carrier tab is inelastic;

a fastener component attached to at least one of the first and second major surfaces of the carrier tab;

an overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the elastic base tab such that the outer edge of the elastic base tab is located between the inner and outer edges of the carrier tab; and

a bonding tape adhesively positioned and welded to the second major surface of the elastic base tab adjacent the overlap region, the bonding tape further adhesively attached and welded to the second major surface of the carrier tab within the overlap region, wherein the inner

edge of the carrier tab is located between the bonding tape and the second major surface of the elastic base tab, and further wherein the bonding tape is inelastic.

29. A closure system according to claim 1, wherein the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region.

30. A closure system according to claim 15, wherein the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region.

31. A closure system comprising:

a base tab comprising an outer edge and first and second major surfaces, wherein at least a portion of the base tab exhibits elasticity;

a carrier tab comprising first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab;

a fastener component attached to at least one of the first and second major surfaces of the carrier tab;

an overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the base tab such that the outer edge of the base tab is located between the inner and outer edges of the carrier tab, wherein the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region; and

bonding tape attached to the second major surface of the base tab adjacent the overlap region, the bonding tape further attached to the second major surface of the carrier tab within the overlap region, wherein the inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab.

32. A closure system according to claim 31, wherein the bonding tape is adhesively attached to the base tab and the carrier tab.

33. A closure system according to claim 31, wherein the bonding tape is welded to the base tab and the carrier tab.

34. A closure system according to claim 31, wherein the bonding tape is adhesively attached and welded to the base tab and the carrier tab.

35. A closure system according to claim 31, wherein the bonding tape comprises a layer of pressure sensitive adhesive facing the base tab and the carrier tab.

36. A closure system according to claim 31, wherein the carrier tab is inelastic.

37. A closure system according to claim 31, wherein the bonding tape is inelastic.

38. A closure system according to claim 31, wherein the base tab comprises an integral portion of a disposable garment.

39. A closure system according to claim 31, wherein the fastener component is adhesively attached to the carrier tab.

40. A closure system according to claim 31, wherein the fastener component comprises a mechanical fastener component.

41. A closure system according to claim 31, wherein the bonding tape is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tab.

42. A closure system according to claim 31, wherein the fastener component is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tab.

43. A closure system comprising:

an elastic base tab comprising an outer edge and first and second major surfaces;

a carrier tab comprising first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab, wherein the carrier tab is inelastic;

a fastener component attached to at least one of the first and second major surfaces of the carrier tab;

an overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the elastic base tab such that the outer edge of the elastic base tab is located between the inner and outer edges of the carrier tab, wherein the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region; and

a bonding tape attached to the second major surface of the elastic base tab adjacent the overlap region, the bonding tape further attached to the second major surface of the carrier tab within the overlap region, wherein the inner edge of the carrier tab is located between the

bonding tape and the second major surface of the elastic base tab, and further wherein the bonding tape is inelastic.

44. A closure system comprising:

a base tab comprising an outer edge and first and second major surfaces;

a carrier tab comprising first and second major surfaces, an inner edge, and an opposing outer edge, the inner edge and the outer edge defining a length of the carrier tab;

a fastener component attached to at least one of the first and second major surfaces of the carrier tab;

an overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the base tab such that the outer edge of the base tab is located between the inner and outer edges of the carrier tab; and

bonding tape adhesively attached and welded to the second major surface of the base tab adjacent the overlap region, the bonding tape further adhesively attached and welded to the second major surface of the carrier tab within the overlap region, wherein the inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab, wherein the bonding tape is welded using a welding technique selected from the group consisting of chemical welding, dynamic mechanical welding, and combinations thereof.

EVIDENCE APPENDIX

Serial No.: 10/674,174

Docket No.: 58328US002

1. European Patent Document No. EP 0 669 121 A1 (entered into the record by citation within the non-final Office Action mailed 19 May 2005).
2. Dilnik et al. (U.S. Patent No. 5,656,111) (entered into the record by citation within the non-final Office Action mailed 15 March 2006).
3. Non-final Office Action mailed 15 March 2006.
4. Final Office Action mailed 10 October 2006.
5. Advisory Action mailed 6 February 2007.



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(71) Applicant: **KIMBERLY-CLARK CORPORATION**
401 North Lake Street
Neenah,
Wisconsin 54956-0349 (US)

(72) Inventor: **Roessler, Thomas Harold**
1034 Greendale Court

Menasha, WI 54952 (US)
Inventor: **van Gompel, Paul Theodore**
W9029 School Road
Hortonville, WI 54944 (US)
Inventor: **O'Rourke, Kathleen Ann**
1239 Maple Street
Neenah, WI 54956 (US)

(74) Representative: **Diehl, Hermann, Dr.**
Dipl.-Phys. et al
DIEHL, GLÄSER, HILTL & PARTNER
Patentanwälte
Flüggengstrasse 13
D-80639 München (DE)

(54) **Methods of forming fastener assemblies.**

(57) A method for forming a plurality of adhesive fastener assemblies includes the step of providing a substantially continuous web of substrate material along a selected, longitudinal machine-direction (132). The substrate web has a laterally extending cross direction (134) which is substantially perpendicular to the machine direction, and has laterally opposed, longitudinally extending side edge regions (142 and 144) thereof. A selected fastening means, such as a layer of primary adhesive (54), is positioned and applied onto a major facing surface (186) of the substrate web (140). A first longitudinally extending web of stiffening material (154) is attached to the major surface of the substrate web (140) at a location which is proximate a first side edge region (142) of the substrate web. A second longitudinally extending web of stiffening material (156) is attached to the major surface of the substrate web (140) at a location which is proximate the second side edge region (144) of the substrate web (140). The web of substrate material and the webs of stiffening material thereby form a substrate composite (192). The substrate web is separated along a longitudinally extending medial region thereof, with a substantially regularly undulating serpentine separation line (158) to provide an opposed pair of fastener tab subas-

semblies (194 and 196).

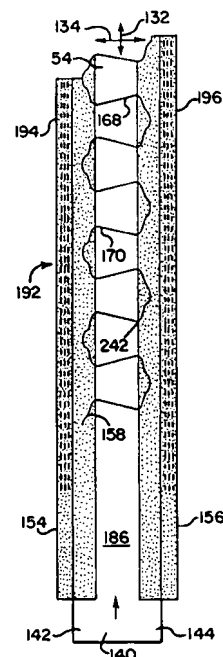


FIG. 4

The present invention relates to methods for forming fastener assemblies.

Conventional disposable absorbent articles have typically employed adhesive fastening tapes for securing the article on a wearer. For example, see U.S. Patent No. 2,714,889 issued August 9, 1955, to U. Chambers and U.S. Patent No. 4,050,462 issued September 27, 1977, to L. Woon et al. Conventional adhesive tape fastening systems have employed adhesive tape tabs which include a non-adhesive section located at the distal free end of the tape tab. This adhesive-free region has typically referred to as a finger tab for facilitating the grasping of the end of the adhesive tape. For example, U.S. Patent No. 4,055,187 issued October 25, 1977, to R. Mack describes an end tab formed by folding the end region of the tab back onto itself. Other adhesive tape structures have included a finger tab formed by placing a separate piece of material at the terminal free end of the tape member. For example, see U.S. Patent No. 4,726,971 issued February 23, 1988, to P. Pape et al.; U.S. Patent No. 3,616,114 issued October 26, 1971, to T. Hamaguchi et al.; U.S. Patent No. 4,801,480 issued January 31, 1989, to V. Panza et al.

Other articles have included a fastening system which extends along substantially the entire length of an ear section of the article. Still other conventional fastening systems have employed tapered fastening tabs where the user's end is relatively wide at the longitudinally extending sides of the diaper, and is tapered to a more narrow width at its distal end. For example, see European Patent 0 233 704 B1 of H. Burkhard et al.

Conventional fastening systems, such as those described above, have not provided an adequate level of dynamic fit in combination with a neat tailored appearance and reliable securement. Processes for producing such conventional fastening systems have not been adequate for producing improved fastening systems that have a greater capability of moving and adjusting to accommodate the stresses and displacements caused by an active wearer. As a result, the conventional methods have not been adequate for producing fastening systems which are configured to exhibit desired levels of reliable securement and comfort.

It is therefore the object of the present invention to provide a method for forming a plurality of fasteners which avoids the above mentioned drawbacks. This object is solved by the methods of independent claims 1, 13 and 19. Further advantageous features, aspects and details of the invention are evident from the dependent claims, the description and the drawings. The claims are to be understood as a first non-limiting approach to define the invention in general terms.

The present invention relates to fastening systems for disposable garments, such as caps, gowns, diapers, shoe covers, incontinence garments and the like. More particularly, the present invention relates to adhesive tape fastening systems and interlocking, mechanical-type fastening systems for disposable articles, such as gowns, diapers, incontinence garments and the like.

Generally stated, a distinctive method for forming a plurality of fastener assemblies includes the step of providing a substantially continuous web of substrate material along a selected, longitudinal direction. The substrate web has a major facing surface thereof, and has first and second side edge regions thereof. A selected fastening means is provided for on the major facing surface of the substrate web. A first web of stiffening material is attached to the substrate web at a location which is proximate the first side edge region of the substrate web. A second web of stiffening material is attached to the substrate at a location which is proximate the second side edge region of the substrate web. A medial region of the substrate web is separated along an undulating serpentine separation line to provide at least first and second fastener tab subassemblies. In particular configurations, either or both webs of side panel material are constructed of an elastomeric material which is stretchable at least along a cross-deckle direction of the method.

A further process aspect of the invention provided a method for forming a plurality of adhesive fastener assemblies, which includes the step of providing a substantially continuous web of substrate material along a selected, longitudinal machine-direction. The substrate web has a laterally extending cross-direction which is substantially perpendicular to said machine-direction, and has laterally opposed, longitudinally extending side edge regions. A component of a primary fastening means is provided on a major facing surface of the substrate web. A first longitudinally extending web of stiffening material is attached to the substrate web at a location which is proximate a first of the substrate side edge regions, and a second longitudinally extending web of stiffening material is attached to the substrate web at a location which is proximate a second of the substrate side edge regions. The substrate web is separated along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line to provide for an opposed pair of fastener tab subassemblies. At least one of the fastener tab subassemblies is divided along a plurality of division lines which extend substantially laterally across the at least one subassembly to provide a plurality of fastener tab components having an appointed factory bond region thereof. The factory

bond regions of a plurality of said fastener tab components are connected to at least one longitudinally extending side edge region of a substantially continuous web of elastomerically stretchable material which is elastomerically stretchable at least along the cross-direction. The elastomerically stretchable web is severed along a plurality of severance lines which extend substantially laterally across the stretchable web to provide for a plurality of composite panel-and-fastener components.

Still another process aspect of the invention provides a method for forming an article having stretch panel fasteners, which includes the step of providing a first, substantially continuous web of elastomerically stretchable material along a selected, longitudinal machine-direction. The material is elastomerically stretchable at least along a laterally extending cross-direction which is substantially perpendicular to the machine-direction. At least a second, substantially continuous web of the elastomerically stretchable material is provided along the machine-direction, and the second web of stretchable material is spaced from the first web of stretchable material by a selected distance along the cross direction. A substantially continuous web of substrate material is provided along the machine-direction at a location which is between the first and second webs of stretchable material. The substrate web has laterally opposed, longitudinally extending side edge regions thereof. A longitudinally extending lateral side edge region of the first web of stretchable material is attached to the first, side edge region of the substrate web to provide a first bonded region. A longitudinally extending lateral side edge region of the second web of stretchable material is attached to the second, side edge region of the substrate web to provide a second bonded region. A first longitudinally extending web of stiffening material is overlapped over the first bonded region and the first stiffening web is connected to the first web of stretchable material and to the substrate web. A second longitudinally extending web of stiffening material is overlapped over the second bonded region and the second stiffening web is connected to the second web of stretchable material and to the substrate web. The substrate web is separated along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line to provide an opposed pair of composite subassemblies. At least one subassembly is divided along a plurality of division lines which extend substantially laterally across the subassembly to provide a plurality of longitudinally paired, combined panel-and-fastener components.

The various process aspects of the present invention can advantageously provide an efficient technique for rapidly producing the taping system

of the invention. In particular configurations, the method can be carried out in-line with the process for manufacturing the associated article that employs the tape fastening system, thereby helping to reduce costs.

The present invention will be more fully understood and further advantages will become apparent when reference is made to the following detailed description of the invention and the drawings, in which:

Fig. 1 representatively shows a top plan view of an article and fastening system which can be produced with the method of the present invention;

Fig. 2 representatively shows a top plan view of a fastening system having a panel-and-fastener component which can be produced with the method of the present invention;

Fig. 3 representatively shows a cross-sectional view of the fastening system illustrated in Fig. 2;

Fig. 4 representatively shows a top plan view of a process for forming a composite web which can be divided into individual fastener tabs;

Figs. 4A and 4B representatively shows a top plan view of an opposed pair of fastener tab subassemblies formed from the composite web illustrated in Fig. 4;

Fig. 4C representatively shows a top plan view of a fastener tab formed from one of the fastener tab subassemblies illustrated in Fig. 4;

Fig. 5 representatively shows a top plan view of a process for forming a composite web which can be divided into individual fastener tabs, wherein webs of stiffening material are composed of a release tape material;

Fig. 5A representatively shows a cross-sectional view of the process configuration illustrated in Fig. 5;

Fig. 6 representatively shows a top plan view of a process for forming a composite web which can be divided into individual panel-and-fastener components;

Fig. 6A representatively shows a cross-sectional view of the process illustrated in Fig. 6;

Fig. 7 representatively shows an alternative method for producing a composite web which can be divided into individual panel-and-fastener components;

Fig. 8 representatively shows a top plan view of an aspect of the invention which includes the step of forming longitudinally-paired fastener tab sets;

Fig. 9 representatively shows a top plan view of an aspect of the invention which is configured to form a selected plurality of longitudinally-paired, panel-and-fastener components;

Fig. 10 representatively shows another alternative method for producing a composite web

which can be divided into individual panel-and-fastener components;

Fig. 11 representatively shows a top plan view of an aspect of the invention which includes the step of connecting longitudinally-paired fastener tab sets to appointed waistband sections of an article web;

Fig. 12 representatively shows a top plan view of an aspect of the invention which includes the step of disposing a web of release tape material onto an adhesive-bearing surface of a substrate web;

Fig. 12A representatively shows a top plan view of a panel-and-fastener subassembly formed from the method illustrated in Fig. 12;

Fig. 12B representatively shows a top plan view of a panel-and-fastener component formed from the subassembly illustrated in Fig. 12A;

Fig. 12C representatively shows a top plan view of the panel-and-fastener component illustrated in Fig. 12B where the fastener tab has been folded over into its storage configuration;

Fig. 12D representatively shows a top plan view of the panel-and-fastener component illustrated in Fig. 12C where the fastener tab has been unfolded from its storage configuration into an arrangement ready for forming a desired user-bond;

Fig. 13 representatively shows a top plan view of another aspect of the invention which includes the step of disposing a web of release tape material onto an adhesive-bearing surface of a substrate web;

Fig. 13A representatively shows a top plan view of a further aspect of the invention which includes the step of disposing a narrower web of release tape material onto an adhesive-bearing surface of a substrate web;

Fig. 13B representatively shows a top plan view of a panel-and-fastener subassembly formed from the method illustrated in Fig. 13A;

Fig. 13C representatively shows a top plan view of a panel-and-fastener component formed from the subassembly illustrated in Fig. 13B;

Fig. 13D representatively shows a top plan view of the panel-and-fastener component illustrated in Fig. 13C where the fastener tab has been folded over into its storage configuration;

Fig. 13E representatively shows a top plan view of the panel-and-fastener component illustrated in Fig. 13D where the fastener tab has been unfolded from its storage configuration into an arrangement ready for forming a desired user-bond;

Fig. 14 representatively shows a partial, top plan view of a composite article web wherein a release tape tab is anchored to an inner surface of a topsheet layer of the article web, and wherein

the fastener tab has been moved from its storage position on the release tape to a position ready for producing the desired user-bond;

Fig. 14A representatively shows a schematic side elevational view of the composite article web illustrated in Fig. 14;

Fig. 15 representatively shows a top plan view of an aspect of the invention which includes the steps of connecting first and second longitudinally extending webs of stiffening material to a major facing surface of a substrate web at locations which are proximate first and second side edge regions of the substrate web, and are laterally, inwardly spaced from each of the corresponding first and second side edge regions of the substrate web; and

Fig. 16 representatively shows a top plan view of an aspect of the invention which includes the steps of attaching first and second longitudinally extending webs of stiffening material to a major facing surface of first and second elastomeric webs at selected locations which laterally, outwardly spaced from the side edge regions of a medially positioned substrate web.

The various embodiments of the invention will be described in the context of a disposable absorbent article, such as a disposable diaper. It is, however, readily apparent that the present invention could also be employed with other articles, such as caps, gowns, shoe covers, feminine care articles, incontinence garments and the like.

Typically, disposable articles are intended for limited use and are not intended to be laundered or otherwise cleaned for reuse. For example, a disposable diaper is discarded after it has become soiled by the wearer.

The method of the present invention can be employed to produce a plurality of selected panel-and-fastener components for various articles, such as a disposable diaper 20. With reference to Figs. 1, 2 and 3, the representative diaper 20 is shown in its fully extended condition with all of the elasticised gathers stretched out and removed. The article has a first waistband section, such as rear waistband section 40, a second waistband section, such as front waistband section 38, and an intermediate section 42 which interconnects the first and second waistband sections. The article comprises a backsheet layer 22, and a pair of side panels 90, each of which extends laterally from opposed lateral ends of at least one waistband section of backsheet 22. Each of the side panels includes a terminal free end region 92 which has a predetermined length dimension 94 thereof. Each side panel also has a width 91 and a base length 93. A stress beam section 98 is connected to each of the side panels 90 along its free end region 92, and the stress beam section provides for a relatively high

Gurley stiffness value, such as a Gurley stiffness value of at least about 20 mg. The stress beam section also has a length dimension 102 which is at least a significant substantial percentage, such as about 33 percent, of the length 94 of the free end region 92 of the side panel. A fastening tab 44 is connected to each of the stress beam sections and is arranged to extend laterally from each of the side panels 90 for securing the waistband sections of the article about a wearer during the use of the article. In particular configurations of the invention, the fastening tab can have a base length 58 which is not more than a selected limited percentage, such as about 90 percent, of the length 102 of the stress beam section 98.

The disposable diaper 20 has a first waistband section, such as rear waistband section 40, a second waistband section, such as front waistband section 38, and an intermediate section 42 which interconnects the first and second waistband sections. The article comprises a backsheet layer 22, and a fastening means, such as fastening tab 44, operably connected to opposed lateral ends of at least one waistband portion 40 or 38 of the backsheet layer for securing the waistband sections of the article about a wearer during the use of the article. The fastening means has a factory bond section 50, a user bond section 52, and a seam section 69 which is located between the factory bond and user bond sections. The user bond section has a length dimension, such as fastening tab length 62, which is larger than a length dimension of said seam section. Depending upon the particular tab configuration, the seam section length may correspond to the base length 58 or the intermediate length 66 of the fastening tab, as appropriate.

An aspect of the invention can provide a fastener article which comprises a tab substrate 48 having a factory bond section 50, a user bond section 52, and a seam section 69 which is located between the factory bond and user bond sections. The user bond section has a length dimension, such as fastening tab length 62, which is larger than a length dimension of the seam section. Depending upon the particular tab configuration, the seam section length may correspond to the base length 58 or to the intermediate length 66 of the fastener tab, as appropriate.

In the various configurations of the invention, diaper 20 can further include a liquid permeable topsheet layer 24 superposed in facing relation with the backsheet layer, and an absorbent body 26 interposed between the backsheet and topsheet layers.

Diaper 20 defines a longitudinally extending length dimension 86 and a laterally extending width dimension 88, as representatively shown in Fig. 1, and may have any desired shape, such as rectan-

gular, I-shaped, a generally hourglass shape, or a T-shape. With the T-shape, the crossbar of the "T" may comprise the front waistband portion of the diaper or may alternatively comprise the rear waistband portion of the diaper.

Backsheet 22 can generally provide an outer cover member of the article and may be composed of a liquid permeable material, but preferably comprises a material which is configured to be substantially impermeable to liquids. For example, a typical backsheet can be manufactured from a thin plastic film, or other flexible liquid-impermeable material. As used in the present specification, the term "flexible" refers to materials which are compliant and which will readily conform to the general shape and contours of the wearer's body. Backsheet 22 prevents the exudates contained in absorbent body 26 from wetting articles, such as bedsheets and overgarments, which contact diaper 20. In particular embodiments of the invention, backsheet 22 is a polyethylene film having a thickness of from about 0.012 millimeters (0.5 mil) to about 0.051 millimeters (2.0 mils). In the shown embodiment, the backsheet is a film having a thickness of about 1 - 1.5 mil. For example, the backsheet film can have a thickness of about 1.25 mil. Alternative constructions of the backsheet may comprise a woven or nonwoven fibrous web layer which has been totally or partially constructed or treated to impart the desired levels of liquid impermeability to selected regions that are adjacent or proximate the absorbent body. Backsheet 22 typically provides the outer cover of the article. Optionally, however, the article may comprise a separate outer cover member which is in addition to the backsheet.

Backsheet 22 may alternatively be composed of a micro-porous, "breathable" material which permits gases, such as water vapor, to escape from absorbent body 26 while substantially preventing liquid exudates from passing through the backsheet. For example, the breathable backsheet may be composed of a microporous polymer film or a nonwoven fabric which has been coated or otherwise treated to impart a desired level of liquid impermeability. For example, a suitable microporous film can be a PMP-1 material, which is available from Mitsui Toatsu Chemicals, Inc., a company having offices in Tokyo, Japan; or an XKO-8044 polyolefin film available from 3M Company of Minneapolis, Minnesota. The backsheet may also be embossed or otherwise be provided with a matte finish to exhibit a more aesthetically pleasing appearance.

The size of backsheet 22 is typically determined by the size of absorbent body 26 and the particular diaper design selected. Backsheet 22, for example, may have a generally T-shape, a generally I-shape or a modified hourglass shape, and

may extend beyond the terminal edges of absorbent body 26 by a selected distance.

Topsheet 24 presents a body-facing surface which is compliant, soft-feeling, and non-irritating to the wearer's skin. Further, topsheet 24 can be less hydrophilic than absorbent body 26, and is sufficiently porous to be liquid permeable, permitting liquid to readily penetrate through its thickness to reach the absorbent body. A suitable topsheet 24 may be manufactured from a wide selection of web materials, such as porous foams, reticulated foams, apertured plastic films, natural fibers (for example, wood or cotton fibers), synthetic fibers (for example, polyester or polypropylene fibers), or a combination of natural and synthetic fibers. Topsheet 24 is typically employed to help isolate the wearer's skin from liquids held in absorbent body 26. The topsheet materials may be composed of a substantially hydrophobic material, and the hydrophobic material may optionally be treated with a surfactant or otherwise processed to impart a desired level of wettability and hydrophilicity. For example, the topsheet can be treated with about 0.28% Triton X-102 surfactant.

Various woven and nonwoven fabrics can be used for topsheet 24. For example, the topsheet may be composed of a meltblown or spunbonded web of polyolefin fibers. The topsheet may also be a bonded-carded-web composed of natural fibers, synthetic fibers or combinations thereof.

For the purposes of the present description, the term "nonwoven web" means a web of material which is formed without the aid of a textile weaving or knitting process. The term "fabrics" is used to refer to all of the woven, knitted and nonwoven fibrous webs.

In the shown embodiment of diaper 20, for example, topsheet 24 and backsheet 22 can be generally coextensive and have length and width dimensions which are generally larger than the corresponding dimensions of absorbent body 26. Topsheet 24 is associated with and superimposed on backsheet 22, thereby defining the periphery of diaper 20.

Topsheet 24 and backsheet 22 are connected or otherwise associated together in an operable manner. As used herein, the term "associated" encompasses configurations in which topsheet 24 is directly joined to backsheet 22 by affixing topsheet 24 directly to backsheet 22, and configurations wherein topsheet 24 is indirectly joined to backsheet 22 by affixing topsheet 24 to intermediate members which in turn are affixed to backsheet 22. Topsheet 24 and backsheet 22 can be affixed directly to each other in the diaper periphery by attachment means (not shown) such as an adhesive bonds, sonic bonds, thermal bonds or any other attachment means known in the art. For ex-

ample, a uniform continuous layer of adhesive, a patterned layer of adhesive, a sprayed pattern of adhesive or an array of separate lines, swirls or spots of construction adhesive may be used to affix topsheet 24 to backsheet 22. It should be readily appreciated that the above-described attachment means, in desired combinations, may also be employed to interconnect and assemble together the other component parts of the article.

Absorbent body 26 can comprise an absorbent pad composed of selected hydrophilic fibers and high-absorbency particles. The absorbent body is positioned between topsheet 24 and backsheet 22 to form diaper 20. The absorbent body has a construction which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquid body exudates. It should be understood that, for purposes of this invention, the absorbent body may comprise a single, integral piece of material, or alternatively, may comprise a plurality of individual separate pieces of material which are operably assembled together.

Various types of wettable, hydrophilic fibrous material can be used to form the component parts of absorbent body 26. Examples of suitable fibers include naturally occurring organic fibers composed of intrinsically wettable material, such as cellulosic fibers; synthetic fibers composed of cellulose or cellulose derivatives, such as rayon fibers; inorganic fibers composed of an inherently wettable material, such as glass fibers; synthetic fibers made from inherently wettable thermoplastic polymers, such as particular polyester or polyamide fibers; and synthetic fibers composed of a nonwettable thermoplastic polymer, such as polypropylene fibers, which have been hydrophilized by appropriate means. The fibers may be hydrophilized, for example, by treatment with silica, treatment with a material which has a suitable hydrophilic moiety and is not readily removable from the fiber, or by sheathing the nonwettable, hydrophobic fiber with a hydrophilic polymer during or after the formation of the fiber. For the purposes of the present invention, it is contemplated that selected blends of the various types of fibers mentioned above may also be employed.

As used herein, the term "hydrophilic" describes materials the surfaces of which are wetted by the contact of aqueous liquids. The degree of wetting of the materials can, in turn, be described in terms of the contact angles and the surface tensions of the liquids and materials involved. Equipment and techniques suitable for measuring the wettability of particular fiber materials or blends of fiber materials can be provided by a Cahn SFA-222 Surface Force Analyzer System. When measured with this system in accordance with the

procedure described in detail herein below, fibers having contact angles less than 90° are designated "wetable", while fibers having contact angles greater than 90° are designated "nonwetable".

Absorbent body 26 can comprise a matrix of hydrophilic fibers, such as a web of cellulosic fluff, mixed with particles of high-absorbency material. In particular arrangements, absorbent body 26 may comprise a mixture of superabsorbent hydrogel-forming particles and synthetic polymer meltblown fibers, or a mixture of superabsorbent particles with a fibrous coform material comprising a blend of natural fibers and/or synthetic polymer fibers. The superabsorbent particles may be substantially homogeneously mixed with the hydrophilic fibers, or may be nonuniformly mixed. For example, the concentrations of superabsorbent particles may be arranged in a non-step-wise gradient through a substantial portion of the thickness (z-direction) of the absorbent structure, with lower concentrations toward the bodyside of the absorbent body and relatively higher concentrations toward the outside of the absorbent structure. Suitable z-gradient configurations are described in U.S.P. 4,699,823 issued October 13, 1987 to Kellenberger et al., the disclosure of which is incorporated herein by reference to the extent that it is consistent (not in conflict) with the present description. Alternatively, the concentrations of superabsorbent particles may be arranged in a non-step-wise gradient, through a substantial portion of the thickness (z-direction) of the absorbent structure, with higher concentrations toward the bodyside of the absorbent body and relatively lower concentrations toward the outside of the absorbent structure. The superabsorbent particles may also be arranged in a generally discrete layer within the matrix of hydrophilic fibers. In addition, two or more different types of superabsorbent may be selectively positioned at different locations within or along the fiber matrix.

The high-absorbency material may comprise absorbent gelling materials, such as superabsorbents. Absorbent gelling materials can be natural, synthetic and modified natural polymers and materials. In addition, the absorbent gelling materials can be inorganic materials, such as silica gels, or organic compounds such as cross-linked polymers. The term "cross-linked" refers to any means for effectively rendering normally water-soluble materials substantially water insoluble but swellable. Such means can include, for example, physical entanglement, crystalline domains, covalent bonds, ionic complexes and associations, hydrophilic associations, such as hydrogen bonding, and hydrophobic associations or Van der Waals forces.

Examples of synthetic absorbent gelling material polymers include the alkali metal and ammonium salts of poly(acrylic acid) and poly

(methacrylic acid), poly(acrylamides), poly(vinyl ethers), maleic anhydride copolymers with vinyl ethers and alpha-olefins, poly(vinyl pyrrolidone), poly(vinylmorpholinone), poly(vinyl alcohol), and mixtures and copolymers thereof. Further polymers suitable for use in the absorbent body include natural and modified natural polymers, such as hydrolyzed acrylonitrile-grafted starch, acrylic acid grafted starch, methyl cellulose, carboxymethyl cellulose, hydroxypropyl cellulose, and the natural gums, such as alginates, xanthan gum, locust bean gum and the like. Mixtures of natural and wholly or partially synthetic absorbent polymers can also be useful in the present invention. Other suitable absorbent gelling materials are disclosed by Assarson et al. in U.S. Patent No. 3,902,236 issued August 26, 1975. Processes for preparing synthetic absorbent gelling polymers are disclosed in U.S. Patent No. 4,076,663 issued February 28, 1978 to Masuda et al. and U.S. Patent No. 4,286,082 issued August 25, 1981 to Tsubakimoto et al.

Synthetic absorbent gelling materials typically are xerogels which form hydrogels when wetted. The term "hydrogel", however, has commonly been used to also refer to both the wetted and unwetted forms of the material.

To improve the containment of the high-absorbency material, absorbent body 26 can include an improved overwrap, such as wrap sheet 28, placed immediately adjacent and around absorbent body 26. The wrap sheet is preferably a layer of absorbent material which covers the major bodyside and outside surfaces of the absorbent body, and preferably encloses substantially all of the peripheral edges of the absorbent body to form a substantially complete envelope thereabout. Alternatively, the wrap sheet can provide an absorbent wrap which covers the major bodyside and outside surfaces of the absorbent body, and encloses substantially only the lateral side edges of the absorbent body.

Accordingly, both the linear and the inwardly curved portions of the lateral side edges of the wrap sheet would be closed about the absorbent body. In such an arrangement, however, the end edges of the wrap sheet may not be completely closed around the end edges of the absorbent body at the waistband regions of the article.

Diaper 20 can also include a surge management layer 84 which helps to decelerate and diffuse surges of liquid that may be introduced into the absorbent body of the article. In the illustrated embodiment, for example, surge layer 84 can be located on an inwardly facing body side surface of topsheet layer 24. Alternatively, surge layer 84 may be located adjacent to an outer side surface of topsheet 24. Accordingly, the surge layer would then be interposed between topsheet 24 and ab-

sorbent body 26.

Leg elastic members 34 are located in the lateral side margins 110 of diaper 20 and are arranged to draw and hold diaper 20 against the legs of the wearer. The elastic members are secured to diaper 20 in an elastically contractible condition so that in a normal under strain configuration, the elastic members effectively contract against diaper 20.

In the embodiment illustrated in Fig. 1, leg elastic members 34 extend essentially along the complete length of the intermediate crotch region 42 of diaper 20. Alternatively, elastic members 34 may extend the entire length of diaper 20, or any other length suitable providing the arrangement of elastically contractible lines desired for the particular diaper design.

Elastic members 34 may have any of a multitude of configurations. The elastic members may comprise a single strand of elastic material, or may comprise several parallel or non-parallel strands of elastic material, or may be applied in a rectilinear or curvilinear arrangement. Where the strands are non-parallel, two or more of the strands may intersect or otherwise interconnect within the elastic member. The elastic members may be affixed to the diaper in any of several ways which are known in the art. For example, the elastic members may be ultrasonically bonded, heat and pressure sealed using a variety of bonding patterns, or adhesively bonded to diaper 20 with sprayed or swirled patterns of hotmelt adhesive.

In the illustrated embodiments of the invention, leg elastic members 34 may comprise a carrier sheet (not shown) to which are attached a grouped set of elastics composed of a plurality of individual elastic strands 39. The elastic strands may intersect or be interconnected, or be entirely separated from each other. The carrier sheet may, for example, comprise a 0.002 cm thick film of unembossed polypropylene material. The elastic strands can, for example, be composed of Lycra elastomer available from DuPont, a business having offices in Wilmington, Delaware. Each elastic strand is typically within the range of about 470 - 1500 decitex (dtx), and may be about 940 - 1050 dtx. In particular embodiments of the invention, for example, three or four strands can be employed for each elasticized legband.

In addition, leg elastics 34 may be generally straight or optionally curved. For example, the curved elastics can be inwardly bowed toward the longitudinal centerline of the diaper with the innermost point (or apex, relative to the cross-direction of the article) of the set of curved elastic strands positioned approximately about 1.9 to about 3.8 cm (0.75 - 1.5 inches) inward from the outer most edge of the set of elastic strands. In particular arrange-

ments, the curvature of the elastics may not be configured or positioned symmetrically relative to the lateral centerline of the diaper. The curved elastics may have an inwardly bowed and outwardly bowed, reflex-type of curvature, and the length-wise center of the elastics may optionally be offset by a selected distance within the range of about 0 - 8 cm toward either the front or rear waistband of the diaper to provide desired fit and appearance.

In the shown embodiment, diaper 20 includes a waist elastic 36 positioned in the longitudinal margins of either or both of front waistband 38 and rear waistband 40. The waist elastics may be composed of any suitable elastomeric material, such as an elastomer film, an elastic foam, multiple elastic strands, an elastomeric fabric or the like. For example, suitable elastic waist constructions are described in U.S. Patent No. 4,916,005 to Lippert et al., the disclosure of which is hereby incorporated by reference to the extent that it is consistent (not contradictory) herewith.

Diaper 20 can also include a pair of elasticized containment flaps 82 which extend longitudinally along the length dimension 86 of the diaper. The containment flaps are typically positioned laterally inboard from leg elastics 34, and substantially symmetrically placed on each side of the lengthwise, longitudinal centerline of the diaper. Examples of suitable containment flap constructions are described in U.S. Patent No. 4,704,116 issued November 3, 1987, to K. Enloe, the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith. The containment flaps may be composed of a wettable or a non-wettable material, as desired.

In an optional, alternative embodiment of the invention, diaper 20 may include elasticized waist flaps, such as those described in U.S. Patent No. 4,753,646 issued June 28, 1988, to K. Enloe, the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith. Similar to the construction of the containment flaps, the waist flaps may be composed of a wettable or non-wettable material, as desired. The waist and/or containment flap materials may be fluid impermeable, permeable to gas, or permeable to both gas and liquid.

Absorbent article structures suitable for use with the present invention are described in U.S. Patent Application Serial No. 07/757,778 of D. Proxmire et al., filed September 11, 1991, and entitled "ABSORBENT ARTICLE HAVING A LINER WHICH EXHIBITS IMPROVED SOFTNESS AND DRYNESS, AND PROVIDES FOR RAPID UPTAKE OF LIQUID" (Attorney Docket No. 9932), now U.S. Patent No. 5,192,606 issued March 9, 1993, the disclosure of which is hereby incorporated by refer-

ence to the extent that it is consistent with the present specification. Other absorbent article structures suitable for use with the present invention are described in European Patent Application No. 92115530; "THIN ABSORBENT ARTICLE HAVING RAPID UPTAKE OF LIQUID"; of W. Hanson et al. filed September 10, 1992 (EP Publication No. 0539703), the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith.

To provide a refastenable adhesive taping system, diaper 20 can include a supplemental landing zone patch 46, which provides a target zone for receiving an adhesive attachment of tape fasteners 44 thereon. In the illustrated embodiment of the invention, landing zone patch 46 is positioned on the outward surface of backsheet 22 and is located on the second, front waistband portion 38 of the diaper. Landing zone patch 46 is constructed of a suitable material, such as polypropylene, polyester, or the like, and is configured and arranged to accept a secure adhesion of tape fasteners 44. In addition, the landing zone patch and the tape fasteners are cooperatively constructed and arranged to provide a releasable adhesion which allows the tape fastener to be removed from the landing zone patch for repositioning and re-adhesion without tearing or excessively deforming the material of backsheet 22. For example, a suitable tape landing zone construction is described in U.S. Patent No. 4,753,649 issued to Pazdernik, the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith.

In various embodiments of the invention, a tape fastener 44 can be located at either or both of lateral end regions 116 and 118 of either or both of waistbands 38 and 40, respectively. The representatively shown embodiment has the tape fasteners located at the terminal side edges of rear waistband 40.

Articles which include separate panel-and-fastener sections which can be constructed with the method of the present invention are described in copending U.S. Patent Application Serial No. 168,615 entitled "DYNAMIC FITTING DIAPER" filed December 16, 1993 by T. Roessler et al. (Attorney Docket No. 10,961). The disclosure of this document is hereby incorporated by reference to the extent that it is consistent herewith.

With reference to Figs. 1 and 2, for example, each side panel 90 extends laterally from the opposed lateral ends of at least one waistband portion of backsheet 22, such as rear waistband portion 40, to provide terminal side sections of the article. In addition, each side panel can substantially span from a laterally extending, terminal waistband edge 106 to approximately the location of a corresponding leg opening section of the diaper. Diaper 20, for

example, has a laterally opposed pair of leg openings formed by appointed, medial sections of the shown pair of longitudinally extending, side edge regions 110. In the various configurations of the invention, the side panels may be integrally formed with a selected diaper component. For example, side panels 90 can be integrally formed from the layer of material which provides backsheet layer 22, or may be integrally formed from the material employed to provide topsheet 24. In alternative configurations, the side panels 90 may be separate members that are connected to backsheet 22, to topsheet 24, in between the backsheet and topsheet, or combinations thereof.

In particular aspects of the invention, each of the side panels 90 may be formed from a separate piece of material which is then suitably assembled and attached to the selected front and/or rear waistband portion of the diaper article. In the illustrated embodiments of the invention, for example, side panels 90 are attached to the rear waistband portion of backsheet 22, and can be operably attached to either or both of the backsheet and topsheet components of the article. The side panels extend laterally to form a pair of opposed waist-flap sections of the diaper, and are attached with suitable connecting means, such as adhesive bonding, thermal bonding, ultrasonic bonding, clips, staples, sewing or the like.

As previously mentioned, various suitable constructions can be employed to attach the side panels 90 to the selected waistband portions of the article. Where the side panels are composed of an elastomeric material, for example, suitable constructions for securing a pair of elastomeric, stretchable members to the lateral, side portions of an article to extend laterally outward beyond the opposite side regions of the outer cover and liner components of an article can be found in U.S. Patent No. 4,938,753 issued July 3, 1990 to P. VanGompel et al., the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith.

In conventional fastening systems, the fastening stress is applied to the factory bond between fastening tab 44 and the side sections of rear waistband 40 substantially across the base length 58 of the fastening tab. As a result, relatively low levels of stress are applied to the regions of the ear sections that are longitudinally adjacent to the side edges of the fastening tab. As a result, the longitudinally adjacent regions tend to wrinkle and curl away from the body of the wearer. The wrinkling and curling can be unsightly and can create gaps along the waistband and along the leg opening region of the diaper through which waste materials may leak from the diaper. Attempts to address this problem have employed complex fastening sys-

terms which extend along substantially the entire free edge length of the ear sections of the article. Other attempts to address this problem have employed multiple fastening tapes or a large, wide fastening tab. The wide fastening tabs or tapered fastening tabs have transmitted excessive stresses to the user-bond securement section of the fastening system. Such stresses can tend to undesirably disconnect the user bond portion of the fastening system when the wearer shifts and moves about. In addition, such configurations may not sufficiently conform and adjust to the movements of the wearer, and can result in excessive irritation of the wearer's skin.

To help address the problems associated with conventional fastening systems such as those described above, the present invention can advantageously provide for a distinctive reinforcement, stress beam section 98. The stress beam can disperse and dissipate the fastening forces across the length of each side panel 90. In addition, the stress beam section can provide for a sufficient stiffening and reinforcement of its associated waistband section to help prevent undesired and excessive wrinkling, necking-down or folding-over of the lateral end of the waistband or side panel during the use of the article.

In the various configurations of the invention, stress beam section 98 can be integrally formed from the same material employed to form the side panel 90 associated therewith. For example, a portion of the free end of a side panel may be doubled over one or more times along longitudinally extending fold lines to generate an operable stress beam section. Alternatively, the stress beam section can be provided by densifying or embossing a selectively sized and shaped region of side panel 90 to an extent which provides operable levels of strength and stiffness.

In other arrangements of the invention, stress beam section 98 can include a stiffening or reinforcement member provided by a selectively shaped and sized region of material which is integrally formed with fastening tab substrate 48. Alternatively, the stress beam section can include a separate stiffening or reinforcement member 97 which is appropriately configured, and is assembled to the free end region of the side panel. For example, the stress beam section can be provided for by a suitably sized and shaped piece of material attached to a suitable surface of each side panel 90, such as an inward bodyside surface of each panel. The material may be composed of a polymer film, a nonwoven fabric, a woven fabric or the like, as well as combinations thereof. In a particular configuration, the stress beam section can include a stiffening member composed of the material employed to construct release tape ma-

terial 74 and/or fastening tab substrate 48. In the various configurations of the invention the stress beam section can be substantially non-extensible and/or substantially non-elastomeric.

With reference to Fig. 2, a stress beam section 98 can be operably connected to each side panel 90 along the free end region 92 of the side panel with suitable attaching means, such as adhesive bonding, thermal bonding, ultrasonic bonding, clips, staples, sewing or the like. The stress beam section has a laterally extending, cross-directional width dimension 100 and a longitudinally extending length dimension 102. To obtain desired performance, it can be advantageous to position stress beam section 98 at a medial location along the length of side panel 90. In the shown embodiment, for example, the stress beam section is substantially centered along the longitudinal length of the free end section of the side panel. A particular aspect of the invention can be configured to employ a separate piece of material which operatively forms a member that overlaps the material of side panel 90 to provide for the desired stress beam section 98.

In other aspects of the invention, stress beam section 98 extends along the longitudinal length of side panel 90 to be substantially coterminous with the laterally extending waistband edge 106 of the article. In the illustrated embodiment, fastening tab 44 is approximately centered along the length of stress beam section 98. Alternatively, the location of fastening tab 44 may be offset longitudinally of the diaper by a selected distance away from the lengthwise center of stress beam section 98.

A fastening means, such as provided by fastening tape 44, is operably connected to each of the side panels 90. In the illustrated configuration, the juncture section along which fastening tab 44 intersects the terminal side edge of panel 90 provides a relatively narrowed panel juncture region 80. The connection may be accomplished with suitable attaching means, such as adhesive bonding, thermal bonding, ultrasonic bonding, clips, staples, sewing or the like. Alternatively, the fastening tab substrate may be integrally formed from the material employed to form stress beam section 98. In optional configurations, the fastening tab may be directly or indirectly connected to the stress beam section 98 associated with the respective side panel. For example, the fastening tab 44 may indirectly connect to its associated stress beam section 98 by way of an intervening section of side panel 90.

In the illustrated embodiments of the invention, the components of the fastening means cooperate to secure the front and rear waistband portions of the article about a wearer. In particular, the rear waistband section of the shown embodiment overlaps the front waistband section of the article and

the fastening means operably attaches to appointed regions of the front waistband portion. Fastening tab 44 has a longitudinally extending length dimension and a laterally extending width dimension. In addition, the fastening tab has a base section 56, a user bond end section 60 and an intermediate section 64 which interconnects the base and end sections. Base section 56 has a longitudinal length dimension 58, end section 60 has a longitudinal length dimension 62, and intermediate section 64 has a longitudinal length dimension 66.

In particular aspects of the invention, fastening tab 44 has, along its respective panel juncture region 80, a base length 58 which is not more than about 90 percent of the length 102 of stress beam section 98. Alternatively, the fastening tab base length is not more than about 80 percent of the stress beam section length, and optionally is not more than about 50 percent of the stress beam section length to provide desired performance. In other aspects of the invention, fastening tab 44 has a base length 58 which is not less than about 1 percent of the length 102 of stress beam section 98. Alternatively, the base length is not less than about 5 percent of the stress beam section length, and optionally is not less than about 20 percent of the stress beam section length to provide desired benefits. Accordingly, when the fastening means is employed to secure the article on the wearer, the end sections 104 of the stress beam section are not further attached to the front waistband of the article by the operation of securing the article on the wearer. As a result, the unattached end sections 104 can advantageously slide, bend and otherwise move relative to the secured portions of the article without excessively disturbing the securing attachment between the user bond section of the fastening tab and the appointed securement zone of the article.

In the illustrated embodiments length 58 of the base section 56 of fastening tab 44 is relatively larger than the length 66 of the fastening tab intermediate section 64. Alternatively, however, base length 58 may be equal to or less than the intermediate section length 66. In either case, the construction of the fastening system of the invention can provide a seam section 69 the fastening tab which is positioned between stress beam section 98 and the user bond section 52 of the fastening tab. As determined when the fastening tab in its relaxed and substantially untensioned condition, the tab seam section generally represents the narrowest region of the fastening tab with respect to those portions of the fastening tab that are spaced from the terminal end sections of the tab. Seam section 69 can advantageously provide a relatively more flexible pivot region which can facilitate a freer, less restricted relative movement between the stress

beam portion of the fastening system and user bond portion of the fastening tab. As a result, the stress beam 98 can operate to help maintain the desired waistband appearance and good fit during the movements of the wearer, and the user bond section 52 can maintain a more reliable securement with less occurrence of undesired pop-opens. The seam section can help isolate the user bond section of the fastening system from the self-adjusting movements of the side panels 90 and the stress beam sections of the fastening system. In the shown embodiment, the seam section 69 is composed of a substantially non-extensible and substantially non-elastomeric material, but may alternatively be composed of an elastomeric material which is operably assembled or otherwise incorporated into the fastening tab structure.

In the various embodiments of the invention, fastening tab 44 can be configured to provide an adhesive fastening mechanism. More particularly, the user bond section 52 of fastening tab 44 can include a layer of primary adhesive 54 disposed across an appointed attaching surface 68 of fastening tab substrate 48. The adhesive is configured to provide a desired level of adhesion and securement when applied against the appointed landing zone region of the article. In addition, the adhesive can be configured to be capable of being removed and refastened one or more times onto the appointed landing zone region. An example of a suitable refastenable taping system is described in U.S.P. 5,147,347 issued September 15, 1992 to Y. Huang et al., the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith.

In various alternative configurations of the invention, the fastening means may be provided by interlocking, mechanical-type fasteners such as hooks, buckles, snaps, buttons and the like. In particular aspects of the invention the fastening means can be provided by a hook-and-loop fastener system, a mushroom-and-loop fastener system or the like (hereinafter hook-and-loop fastener). Such fastening systems generally comprise a "hook" component and a cooperating "loop" component which engages and interlocks with the hook component. Such systems are, for example, available under the VELCRO trademark. Examples of suitable hook-and-loop fastening systems are described in U.S.P. 5,019,073 issued May 28, 1991 to T. Roessler et al., the disclosure of which is hereby incorporated by reference to the extent that it is consistent herewith. In a typical configuration of a hook-and-loop fastening system, a portion of hook material is operably connected to the attaching surface 68 of fastening tab substrate 48, and the loop material is employed to construct a cooperating landing zone 46. The landing zone patch, for

example, can be suitably attached to the appointed landing zone region on the outside surface of back-sheet 22. An alternative configuration of a suitable hook-and-loop fastening system may have the loop material secured to the attaching surface 68 of fastening tab substrate 48. Accordingly, a region of hook material would be employed to form landing zone patch 46.

Fastening tab 44 can advantageously have a stiffness value which is different than the stiffness value of stress beam 98. As a result, fastening tab 44 can be selectively configured with a user bond section 52 which is capable of being fastened, removed and refastened without excessively distorting or tearing the appointed landing zone region of the article. The selective tailoring of the characteristics of fastening tab 44 can be accomplished while retaining the desired stress beam characteristics of stress beam section 98. The stress beam section retains its ability to spread forces across the free end length 94 of side panel 90 without adversely affecting the fastening and refastening capability of fastening tab 44.

In particular aspects of the invention, the user bond end section 60 of fastening tab 44 can have an end length 62 which is greater than the length 66 of the intermediate section 64 of the fastening tab, as representatively shown in Fig. 2. In the illustrated embodiment, for example, the end length can correspond to the widest length dimension of the user bond section 52 of the fastening tab. In other aspects of the invention, the length 62 of end section 60 can also be greater than the length 58 of base section 56 of the fastening tab.

More particularly, end length 62 can be at least about 10 percent greater than intermediate length 66. Alternatively, the end length can be at least about 20 percent greater than the intermediate length, and optionally can be at least about 40 percent greater than the intermediate length. In other aspects of the invention, end length 62 can be not more than about 500 percent greater than intermediate length 66. Alternatively, the end length 62 is not more than about 100 percent greater than intermediate length 66, and optionally is not more than about 60 percent greater than the intermediate length.

End length 62 can be at least about 2 percent greater than base length 58. Alternatively, end length 62 can be at least about 20 percent greater than base length 58, and optionally can be at least about 40 percent greater than the base length. In other aspects, end length 62 can be not more than about 500 percent greater than base length 58. Alternatively, end length 62 can be not more than about 100 percent greater than base length 58, and optionally is not more than about 60 percent greater than the base length of the fastening tab to

provide desired performance.

In the illustrated embodiment, for example, intermediate section 64 of fastener tab 44 can be configured to provide an expanding area of the fastener tab. The expanding area provides a gradual transition between base length 58 and end length 62. To avoid the generation of excessive stress concentrations that might initiate undesired fractures, the transition area is substantially free of sharp notches or abrupt angles.

The relatively smaller base and/or intermediate lengths of tab 44 can advantageously contribute to the improved performance provided by the invention. The relatively larger length at the end portion of the user bond section 52 helps provide for a larger user bonding area which can improve the security of the fastening system. At the same time, the relatively smaller length at the base and/or intermediate portions of tab 44 can provide for a relatively greater ease of bending and/or twisting or other movement, as compared to the user bond portion of the tab. As a result, the fastening securement can be maintained at high levels while allowing substantially continual, dynamic fit adjustments at the points of interconnection between the front and rear waistband sections of the article.

With reference to Figs. 2 and 3, a tape fastener tab 44 can comprise a tape substrate member 48 having the desired fastening means, such as primary adhesive layer 54, located and disposed on a major facing surface thereof, such as surface 68. The fastener tab provides a factory-bond section 50 for connecting the tape substrate member to a selected portion of diaper 20, and a user-bond section 52 for connecting and securing the waistband sections of the diaper about the body of a wearer. In a particular aspect of the invention, the factory-bond section of fastener tab 44 is attached to the free end region 92 of side panel 90, and is constructed and configured to provide stress beam section 98.

The factory-bond region 50 of tape fastener 44 is appointed for securement onto the desired section of its associated article during the manufacture of the article. The user-bond region 52 of tape fastener 44 is appointed for securing the article on a wearer during use. The representatively shown embodiment of the tape fastener, for example, has primary adhesive layer 54 applied onto a selected surface thereof to provide an adhesive fastening system. In the illustrated embodiment of diaper 20, the factory-bond region 50 of tape fastener 44 is attached to the lateral ends of rear waistband 40, and the user-bond region 52 of the tape fastener is employed to attach the lateral ends of rear waistband 40 to the corresponding lateral ends of front waistband 38 to secure the diaper about the waist of a child. User-bond section 52 connects to a

finger tab 70 which includes a substantially non-attaching grasping section 72 thereof. The grasping section can, for example, comprise a layer of exposed absorbent material, and at least a portion of the exposed absorbent material can be operably positioned and arranged to face in the same direction as an appointed inward face of the tape fastener.

With an adhesive fastening tab, a primary adhesive layer 54 can be disposed upon an appointed inwardly facing surface of substrate member 48. The portion of adhesive positioned on factory-bond 50 can be employed to assemble tape fastener 44 onto diaper 20 during the manufacture of the diaper. The portion of adhesive layer 54 located on user-bond region 52 can be employed to secure the diaper onto an infant. The particular adhesive parameters of adhesive layer 54 can be selected and tailored to meet desired adhesive properties, such as adhesive shear strength and adhesive peel strength.

Suitable materials for constructing fasteners 44, such as sheet materials for constructing substrate member 48 and adhesive materials for constructing layer 54, are available from various manufacturers, such as 3M Company, a business having a Disposable Products Division with offices in the 3M Center, St. Paul, Minnesota; and Avery International, a business having a Specialty Tape Division with offices in Painesville, Ohio.

The illustrated embodiment of the tape fastening system includes a release tape member 74 for releasably holding user-bond region 52 of the tape fastener in a storage position which protects the user-bond region of primary adhesive layer 54 against contamination or premature adhesion against other portions of diaper 20. In the illustrated embodiment, release tape 74 is positioned in a superposed, adjacent relation with substrate member 48, and is attached to an interior surface of diaper 20. The representatively shown embodiment of release tape 74 includes an anchor surface 76 and an opposite release surface 78. Anchor surface 76 has disposed thereon a suitable anchor adhesive layer, and release surface 78 has disposed thereon a selected layer of an operable release coating, such as a coating composed of cured (cross-linked) poly dimethyl siloxane (PDMS). Suitable release tapes are commercially available from vendors such as 3M Company and Avery International. For example, suitable release tape materials include the FT-4430 material available from Avery International. The release tape material includes a release surface against which the adhesive bearing surface of the fastening tab can be stored and protected from contamination. The fastening adhesive, however, readily separates from the release surface when desired.

In a particular embodiment of the invention, a terminal end portion of release tape 74 may optionally overlap and adhesively bond to an intermediate section of substrate member 48 along a bond region which traverses across the length of the substrate member. The resultant interconnection between substrate member 48 and release tape 74 provides for a Y-bond which can strengthen the assembly and attachment of tape fastener 44 to the section of diaper 20 that is clamped between release tape 74 and factory-bond region 50 of tape substrate member 48. In other aspects of the invention, release tape 74 can be constructed and configured to provide for stress beam section 98.

The user-bond region of tape substrate member 48 has a distal end section 108 which is appointed for grasping by the user to suitably position and adhere the user-bond region of tape fastener 44 to an appointed tape securement zone of the article. In the illustrated embodiment, for example, the user will typically grasp end section 108 to adhere the tape fastener against landing zone patch 46. Distal end section 108 can be constructed to be non-adhering and non-securing so that the end section can be more easily found and lifted by the user.

In a particular aspect of the invention, tape fastener 44 can include a separate finger tab member 70 connected to substrate end section 60 along an attachment region. In an optional configuration of the invention, finger tab 70 may be constructed by providing a particular physical or chemical treatment applied to end section 60 of substrate member 48. In the illustrated embodiment, for example, the finger tab can be a layer of release tape material. In alternative configurations, the treatment can be configured to impart desired absorbency and/or tactile characteristics to the gripping region of the resultant finger tab. In yet other aspects of the invention, finger tab 70 can be composed of a material which is capable of absorbing selected amounts of contaminants, such as powders, liquids, and creams, which may be carried on the fingers of the user. The material of finger tab 70 may substantially end at the longitudinally terminal edge of the tab substrate member. Alternatively, finger tab 70 may extend beyond the terminal edge of the tape substrate member.

The process of the invention provides a distinctive method for forming a plurality of tape fasteners 44 having an improved shape and configuration. An aspect of the process of the invention can also be configured to provide a plurality of fastener tabs 44 connected to a web of side panel material. In particular configurations the side panel material can be elastomeric. The process can be advantageously employed in-line with an operation for manufacturing a selected article, such as a disposable

diaper, incontinence garment, feminine care article, gown, garment or the like. The resultant process can be configured to rapidly form a plurality of individual tape fasteners operably connected to side panel members, and then assemble the panel-and-fastener components to the selected article. The process can also be configured to assemble a release tape component to the article, as desired.

In the process aspect of the invention representatively shown in Figs. 4, 4A, 4B and 4C, a method for forming a plurality of fasteners includes the step of providing a substantially continuous web of substrate material along a selected, longitudinal machine-direction 132. The substrate web has a laterally extending cross direction 134 which is substantially perpendicular to the machine direction, and has laterally opposed, longitudinally extending, first and second side edge regions 142 and 144 thereof. A selected fastening means, such as a layer of primary adhesive 54, is positioned and applied onto a major facing surface 186 of the substrate web 140. A first longitudinally extending web of stiffening material 154 is attached to the major surface of substrate web 140 at a location which is proximate a first side edge region 142 of the substrate web. A second longitudinally extending web of stiffening material 156 is attached to the major surface of substrate 140 at a location which is proximate the second side edge region 144 of substrate web 140. The web of substrate material and the webs of stiffening material thereby form a substrate composite 192. The substrate web is separated along a longitudinally extending medial region thereof, with a substantially regularly undulating serpentine separation line 158 to provide an opposed pair of fastener tab subassemblies 194 and 196. At least one fastener tab subassembly, and preferably both fastener tab subassemblies 194 and 196 can be divided along a plurality of division lines 208 which extend substantially laterally across the at least one assembly to provide a plurality of fastener tab components 166. Each of the fastener tab components has an appointed factory bond region 50 thereof.

In the various aspects and configurations of the invention described herein, the webs of stiffening material can be provided by a first web of release material 182 and a second web of release material 184. Accordingly, with reference to Figs. 5 and 5A, the web of substrate material 140 has a major facing surface 186 thereof, and has first and second side edge regions 142 and 144, respectively. A component of a primary fastening means, such as a layer of primary adhesive 54, is provided across the major surface of substrate web 140. A first securement surface 188 of a side edge portion of the first web of release material 182 is attached to the first side edge region 142 of the substrate web

140. The first release web 182 has a release surface 232 thereof, which is positioned opposite the securement surface of the release web. The release surface is constructed to releasably connect to the selected component of the primary fastening means. A second securement surface 190 at a side edge region of the second web of release material 184 is attached to the second side edge region 144 of substrate web 140. The second release web 184 has a release surface 234 thereof which is positioned opposite the second securement surface 190. The release surface is constructed to releasably connect to the selected component of the primary fastening means. The substrate web and the first and second release webs thereby form a substrate composite 192. A medial region of the substrate web 140 is separated along a generally longitudinally extending serpentine line 158 to provide at least first and second fastener tab subassemblies 194 and 196.

In the various configurations of the invention, at least one fastener tab subassembly, and preferably both fastener tab subassemblies 194 and 196 can be divided along a plurality of division lines 208 which extend substantially laterally across the at least one assembly to provide a plurality of fastener tab components 166. As representatively shown in Fig. 4C, each of the fastener tab components has an appointed factory bond region 50 thereof which can be employed to operably connect at least one of the fastener tabs to each of a pair of lateral side regions of an appointed waistband portion of an article.

Further aspects of the invention can include the steps of attaching a first longitudinally extending web of side panel material to an outboard side region of the first fastener tab subassembly, and attaching a second longitudinally extending web of side panel material to an outboard side region of the second fastener tab subassembly. In particular configurations, either or both of the side panel webs can be composed of an elastomeric material which is elastically stretchable at least along a cross-direction of the side panel webs. The fastener tab subassemblies can be separated along appropriately selected division lines 164 (Fig. 7) to provide a plurality of panel-and-fastener components which can be operably connected to each of a pair of lateral side regions of an appointed waistband portion of an article. Suitable techniques for such operations are described below.

In the various aspects of the invention described herein, the generally longitudinally extending, substantially regularly undulating, serpentine separation line 158 can optionally and desirably include substantially regularly alternating, longitudinally retroceding portions 168 and 170 thereof. The retroceding portions of the separation line can be

configured to provide for a fastening tab having a seam section 69 which is relatively narrower than the major portion of the user bond section 52 of the fastening tab 44. More particularly, the retroceding portions of the separation line can be arranged to provide the relatively narrower base sections 56 and intermediate sections 64 of the subsequently produced fastening tabs 44. In the shown configurations, serpentine line 158 also includes traversing sections 242 which generally extend laterally along the cross-direction 134 of the process. Serpentine line 158 can be produced by various conventional techniques, such as die-cutting, water-cutting, thermal-cutting and the like.

In one aspect of the invention, the traversing sections 242 of the serpentine line can be configured to extend along a distance which extends to intrude into at least a portion of each release tape web 182 and 184, as representatively shown in Fig. 5. As a result, with respect to an individual fastening tab 44, the material from one release tape web helps to provide for the stress beam section 98 associated with the particular fastening tab 44, and the material from the second, oppositely located release tape web provides the material for forming an appropriate finger tab 70 associated with the particular fastening tab 44.

The process of the invention can further be configured to form a plurality of stretch panel fasteners. For example, in an aspect of the invention representatively shown in Fig. 6, a first web of side panel material, such as first a stretchable web 130, can be connected to a laterally outboard side edge region 198 of the tape substrate composite 192 to form a first, panel-and-fastener composite subassembly, such as first subassembly 160. More particularly, the stretchable web can be attached to the substrate web at a location which corresponds with the appointed factory bond regions of the individual fasteners formed from the first composite, fastener tab section 194. A second web of side panel material, such as second stretchable web 136, can be connected to a laterally outboard side edge region 200 of the second substrate composite section 196 to form at least a second, panel-and-fastener composite subassembly, such as subassembly 162. Stretchable web 136 can be attached to the substrate web at a location which corresponds with the appointed factory bond regions of the individual fasteners formed from the second composite, fastener tab section 196. In particular configurations, either or both webs of side panel material can be constructed of an elastomeric material which is elastically stretchable at least along the cross-deckle direction 134 of the method. The panel-and-fastener subassemblies are separated along appropriately selected, cross-directional dividing lines 164 to produce a plurality of individual

panel-and-fastener components 166.

An alternative aspect of the process of forming a plurality of stretch panel fasteners can be arranged to connect the factory bond regions 50 of a plurality of the fastener tab components 44 to at least one longitudinally extending side edge region 146 of a substantially continuous web of elastomerically stretchable material 130, as representatively shown in Fig. 7. Web 130 is elastomerically stretchable at least along cross direction 134. The elastomerically stretchable web 130 can be severed along a plurality of division lines 164 to provide a plurality of composite panel-and-fastener components 166.

In other aspects of the invention, the factory bond regions 50 of a plurality of fastener tab components 44 can optionally be connected to first and second laterally opposed, longitudinally extending side edge regions 146 and 147 of the elastomerically stretchable web 130. The fastener tab components connected to the first side edge region 146 are offset along machine direction 132 relative to the fastener tab components connected to the second side edge region 147 of web 130. The amount of offset spacing between consecutive, laterally extending centerlines of successive fastener tabs 44 can, for example, generally correspond to the desired extent of an appointed side panel member 90 along the longitudinal direction of the intended article of manufacture.

A further aspect of the method of the invention, representatively shown in Fig. 8, includes the step of dividing at least one of the fastener tab subassemblies 194, and preferably both fastener tab subassemblies 194 and 196, along a plurality of division lines 208 which extend substantially laterally across the at least one fastener tab subassembly to provide a plurality of adjacently connected, longitudinally-paired fastener tab component sets 210 having an appointed factory bond regions 50 thereof. The factory bond regions of a plurality of the longitudinally-paired fastener tab sets 210 can be connected to at least one longitudinally extending side edge region 146 of a substantially continuous web of elastomerically stretchable material 130. Elastomeric web 130 can be severed along a plurality of severance lines 164 which extend substantially laterally across the stretchable web and substantially between the adjacently located fastener tabs 44 and 44a forming a fastener tab set 210. The severance lines may optionally have a selected contour, as needed to provide a plurality of composite panel and fastener components 166 having a desired size and shape.

For example, in a particular configuration of the invention representatively shown in Fig. 9, a first plurality of the longitudinally-paired fastener tab component sets 210 can be connected to a first

longitudinally extending side edge region 146 of elastomeric web 130 and a second plurality of the longitudinally-paired fastener tab sets 210 can be connected to a second laterally opposed longitudinally extending side edge region 147 of the elastomeric web 130. The fastener tab component sets connected to the first side edge region 147 are offset along machine direction 132 relative to the fastener tab component sets connected to the second side edge region 146. The amount of offset spacing between consecutive, laterally extending centerlines of successive, longitudinally-paired fastener tab sets 210 can, for example, generally correspond to twice the desired extent of an appointed side panel member 90 along the longitudinal direction of the intended final article of manufacture. Alternative configurations of the process can have each of the longitudinally paired fastener tab component sets 210 connected along a single side edge of the elastomeric web 130. The resultant composite assembly can be separated along selected contoured division lines 164 to provide longitudinally-paired, panel-and-fastener components 178.

It should be appreciated that the various steps in the method of the invention can be conducted in various other sequences to arrive at substantially the same result. For example, with reference to Fig. 10, the method for forming a plurality of stretch panel fasteners can include the step of providing a first, substantially continuous web of elastomerically stretchable material 130 extending along a selected, longitudinal machine-direction 132. The first stretchable web 130 is elastomerically stretchable at least along a laterally extending cross direction 134 which is substantially perpendicular to machine direction 132. At least a second, substantially continuous web of elastomerically stretchable material 136 is delivered along machine direction 132. The second web of stretchable material 136 is elastomerically stretchable at least along cross-direction 134, and is laterally spaced from the first web of stretchable material 130 by a selected distance 138 along the cross direction. A substantially continuous web of substrate material 140 is provided along machine direction 132 at a location which is between the first and second webs 130 and 136, respectively, of stretchable material. Substrate web 140 has laterally opposed longitudinally extending side edge regions 142 and 144 thereof. A longitudinally extending lateral side edge region 146 of the first web 130 of stretchable material is attached to the first side edge region 142 of substrate web 140 to provide a first bonded region 148. A longitudinally extending lateral side edge region 150 of the second web 136 of stretchable material is attached to the second side edge region 144 of substrate web 140 to provide a

second bonded region 152. A first longitudinally extending web of stiffening material 154 is laid to overlap first bonded region 148, and is operably connected to the first web of stretchable material 130 and to substrate web 140. In particular, the first web of stiffening material 154 can connect to side edge region 146 of stretchable web 130 and to the first side edge region 142 of substrate web 140. A second longitudinally extending web of stiffening material 156 is laid to overlap second bonded region 152, and is operably connected to the second web of stretchable material 136 and to substrate web 140. In particular, stiffening web 156 can connect to side edge region 150 of the second stretchable web and to second side edge region 144 of substrate web 140. Substrate web 140 is separated along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line 158 to provide an opposed pair of composite subassemblies 160 and 162. At least one subassembly, and preferably both subassemblies, are divided along a plurality of division lines 164 which extend substantially laterally across each subassembly to provide a plurality of combined panel-and-fastener components 166.

The overlapping of stiffening webs 154 and 156 can operate to provide for stress beam sections 98 on the individual fastening tabs 44. The material of stiffening webs 154 and 156 can be any material suitable for imparting the desired stiffness level to the appointed stress beam sections 98 of the individual fastening systems. Particular configurations of the invention employ stiffening webs composed of the material employed to provide release tape sections 74 for the individual fastener tabs 44.

In particular arrangements of the invention, the first stiffening web can have an outboard side region thereof which extends laterally beyond and away from the first side edge region 142 of substrate web 140, and the first web of side panel material can be attached to the outboard side region of the first stiffening web to form the first panel-and-fastener subassembly. Similarly, the second stiffening web can have an outboard lateral side region thereof which extends laterally beyond and away from the second side edge region 144 of the substrate web 140, and the second web of side panel material can be attached to the outboard side region of said second stiffening web to form the second panel-and-fastener subassembly.

In the various aspects of the invention described herein, the process can further include the step of securing at least one of the panel-and-fastener components 166 to each of a selected pair of opposed, laterally spaced end regions 172 of appointed waistband sections 174 of an article web 176, as representatively shown in Fig. 11. The article web may, for example, include the material

employed to produce back sheet 22 of diaper 20. The article web may also include the material employed to produce the topsheet 24 or other component of the end product article, and may optionally include individual absorbent bodies 26 assembled therewith. A securement 246 (Fig. 14A) may be provided by a suitable attaching mechanism, such as adhesive bonding, thermal bonding, ultrasonic bonding, clips, staples, sewing or the like.

In particular aspects of the invention, at least one composite subassembly 160, and preferably both subassemblies 160 and 162, can be divided along a selected plurality of division lines 164 which are configured and arranged to extend substantially laterally across each subassembly to provide a plurality of longitudinally paired, combined panel-and-fastener components 178 (Fig. 9). At least one of the longitudinally paired panel-and-fastener components 178 can be secured to each of two opposed, laterally spaced side regions 172 of an appointed waistband section 174 of an article web 176 to provide a composite article web 180 (Fig. 11). The composite article web is severed along a cross-direction 134 thereof at a location 206 which operably divides each of the longitudinally paired panel-and-fastener components 178 into two individual panel-and-fastener components 166.

In optional configurations of the invention, the method can include the step of superposing a web of release tape material 182 onto the medial section of substrate web 140. Release tape web 182 is arranged to place release surface 78 against the primary adhesive layer 54 on substrate web 140. In this configuration of the invention, the forming of serpentine separation line 158 severs both substrate web 140 and release tape web 182 during the course of providing the opposed pair of composite subassemblies 160 and 162, or 194 and 196. The securing surface 188 of the release tape web can be employed to anchor the subsequently formed individual release tape members to suitable portions of the final article, such as an inner bodyside surface of diaper 20.

With reference to Fig. 12, the method for forming a plurality of stretch panel fasteners can include the step of providing a first, substantially continuous web of elastomerically stretchable material 130 extending along a selected, longitudinal machine-direction 132. The first stretchable web 130 is elastomerically stretchable at least along a laterally extending cross direction 134 which is substantially perpendicular to machine direction 132. At least a second, substantially continuous web of elastomerically stretchable material 136 is delivered along machine direction 132. The second web of stretchable material 136 is elastomerically stretchable at least along cross-direction 134, and

is laterally spaced from the first web of stretchable material 130 by a selected distance 138 along the cross direction. A substantially continuous web of substrate material 140 is provided along machine direction 132 at a location which is between the first and second webs 130 and 136, respectively, of stretchable material. Substrate web 140 has laterally opposed longitudinally extending side edge regions 142 and 144 thereof. A longitudinally extending lateral side edge region 146 of the first web 130 of stretchable material is attached to the first side edge region 142 of substrate web 140 to provide a first bonded region 148. A longitudinally extending lateral side edge region 150 of the second web 136 of stretchable material is attached to the second side edge region 144 of substrate web 140 to provide a second bonded region 152. A first longitudinally extending web of stiffening material 154, such as a first web of spunbond nonwoven fabric or other suitable material, can optionally be laid to overlap first bonded region 148, and is operably connected to the first web of stretchable material 130 and to substrate web 140. In particular, the first web of stiffening material 154 can connect to side edge region 146 of stretchable web 130 and to the first side edge region 142 of substrate web 140. A second longitudinally extending web of stiffening material 156, such as a second web of spunbond nonwoven fabric or other suitable material, can optionally be laid to overlap second bonded region 152, and is operably connected to the second web of stretchable material 136 and to substrate web 140. In particular, stiffening web 156 can connect to side edge region 150 of the second stretchable web and to second side edge region 144 of substrate web 140. Release tape web 182 is delivered and arranged to place release surface 78 against the primary adhesive layer 54 on substrate web 140. Substrate web 140 is separated along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line 158 to provide an opposed pair of composite subassemblies 160 and 162. The forming of serpentine separation line 158 operably severs both substrate web 140 and release tape web 182 during the course of providing the opposed pair of composite subassemblies 160 and 162. At least one subassembly, and preferably both subassemblies, are divided along a plurality of division lines 164 which extend substantially laterally across each subassembly to provide a plurality of combined panel-and-fastener components 166, as representatively shown in Figs 12A and 12B.

The securing surface 188 of the release tape web can be employed to anchor the subsequently formed individual release tape members to suitable portions of the final article, such as a selected, inner bodyside surface of diaper 20. As representa-

tively shown in Figs. 12C and 12D, for example, the release tape 74 can be anchored to a selected surface region of the individual panel-and-fastener component 166. Alternatively, the release tape 74 can be anchored to a selected area of the bodyside surface of topsheet layer 24.

For example, a further aspect of the invention, representatively shown in Fig. 13, generally corresponds to the configuration of the invention shown in Fig. 12, except that the optional steps of providing stiffening webs 154 and 156 are deleted. Fig. 13A illustrates an alternative configuration of the invention which employs a relatively narrower web of release tape material 182. In the arrangement of Fig. 13A, the release tape web overlies the adhesive layer 54, but does not overlap the elastomeric webs 130 and 136.

At least one subassembly 162, and preferably both subassemblies, are divided along a plurality of division lines 164 which extend substantially laterally across each subassembly to provide a plurality of combined panel-and-fastener components 166, as representatively shown in Figs. 13B and 13C. Similar to the process illustrated in Fig. 12, the configuration of the invention illustrated in Fig. 13 can be arranged to anchor the release tape 74 can be anchored to a selected surface region of the individual panel-and-fastener component 166, as representatively shown in Figs. 13D and 13E.

Alternatively, the release tape 74 can be anchored to a selected area of the bodyside surface of topsheet layer 24 of the composite web 180, as representatively shown in Fig. 14. The Figure illustrates the configuration of fastening tab 44 after the tab has been peeled from the release surface of the release tape 74, and the user-bond adhesive on the tab has been exposed for use. In the storage condition that would typically precede the arrangement shown in Fig. 14, the adhesive bearing, user-bond surface of fastening tab 44 is appropriately arranged such that it can be releasably positioned and held against the release surface of release tape 74. As a result, when side panel 90 is in its storage configuration, the side panel is folded over upon itself to allow for more efficient packaging.

Accordingly, a further aspect of the invention can include the steps of securing at least one of said panel-and-fastener components to each of two laterally opposed end regions 172 of the appointed waistband section 174 of the article web 176 to provide the composite article web 180; and inwardly folding the first and second webs of elastomerically stretchable material 130 and 136 to anchor the securing surface of the release tape material onto a selected surface region of the composite article web.

With reference to Fig. 15, another aspect of the invention can include the step of connecting the

first longitudinally extending web of stiffening material 154 is attached to a major facing surface of substrate web 140 at a location which is proximate the first side edge region 142 of the substrate web, and is laterally, inwardly spaced from the first side edge region of the substrate web. In addition, the second longitudinally extending web of stiffening material 156 is attached to a major facing surface of substrate web 140 at a location which is proximate the second side edge region 144 of the substrate web 140, and is laterally, inwardly spaced from the second side edge region of the substrate web.

With reference to Fig. 16, another aspect of the invention can include the step of connecting substrate web 140 between two side panel webs, such as provided by first and second elastomeric webs 130 and 136. The first longitudinally extending web of stiffening material 154 is attached to a major facing surface of elastomeric web 130 at a location which is proximate the first bonded edge region 148 of the elastomeric web 130, and is laterally, outwardly spaced from the first side edge region 142 of the substrate web 140. In addition, the second longitudinally extending web of stiffening material 156 is attached to a major facing surface of elastomeric web 136 at a location which is proximate the second bonded edge region 152 of elastomeric web 136, and is laterally, outwardly spaced from the side edge region 144 of the substrate web 140. Accordingly, the process can be employed to form a fastener system having a stress beam section 98 spaced a selected, discrete distance from the edge of its associated fastener tab 44.

In the various configurations of the invention, the elastomerically stretchable webs 130 and 136 can be composed of any of the materials employed to construct the appointed elastomeric side panels 90. Accordingly, the elastomeric webs can be composed of a stretch-bonded-laminate (SBL) material, a neck-bonded-laminate (NBL) material, an elastomeric film, an elastomeric foam material, or the like. For example, suitable meltblown elastomeric fibrous webs for forming side panels 90 are described in U.S.P. 4,663,220 issued May 5, 1987 to T. Wisneski et al., the disclosure of which is hereby incorporated by reference. Examples of composite fabrics comprising at least one layer of nonwoven textile fabric secured to a fibrous elastic layer are described in European Patent Application No. EP 0 110 010 published on April 8, 1987 with the inventors listed as J. Taylor et al., the disclosure of which is hereby incorporated by reference. Examples of NBL materials are described in U.S. Patent No. 5,226,992 issued July 13, 1993 to Mormon, the disclosure of which is hereby incorporated by reference.

Similarly, substrate web 140 can be composed of any one of the materials suitable for providing fastener tab substrate 48. Accordingly, the substrate web can be composed of a fabric material or a suitable polymer film material, such as polypropylene, polyethylene or other suitable polyolefin. The material comprising substrate web 140 may be opaque, translucent or transparent, as desired, and may include graphics thereon. Optionally, the material may be tinted and/or textured, and may also be selectively embossed. In particular aspects of the invention, substrate web 140 can be constructed of a substantially non-extensible and/or a substantially non-elastomeric material to provide desired benefits.

Release tape webs 182 and 184 can be composed of any of the suitable materials desired for providing release tape 74. Accordingly, the release tape webs can, for example, be composed of a 3M KS-0080 release tape composed of a 76.2 μm (3.5 mil) thick polypropylene film with a poly dimethylsiloxane release coating and an aliphatic resin. Such release tapes are available from the 3M Company, St. Paul, Minnesota.

It should be readily appreciated that the various webs employed in the method of the invention can be suitably attached to each other employing conventional connecting means. Such connecting means can include, for example, adhesive bonding, thermal bonding, ultrasonic bonding, clips, staples, sewing, or the like, or combinations thereof.

In the various aspects of the invention, the individual fasteners 44 and the individual panel-and-fastener components 166 can be nested within the corresponding fastener tab and composite subassemblies from which the fasteners and panel-and-fastener components are formed. With respect to the individual fastener tabs formed from subassemblies 194 and 196, for example, the fastener tabs formed from subassembly 194 are substantially of equal size and are approximately mirror images of the complementary fasteners formed from subassembly 196. The fasteners tabs produced from nested subassembly 194 are slightly offset from the fasteners produced from nested subassembly 196 by a discrete distance along the length dimension of substrate material 140. More particularly, a nested fastener from subassembly 194 is offset from its opposed counterpart fastener from subassembly 196 by approximately one-half of the desired top-to-bottom span along of an individual tape fastener 44 along the length dimension of the article. In the illustrated embodiment, serpentine separation line 158 stops short of the laterally outboard edges of the finger tab/release tape webs 182 and 184 along cross-direction 134. Optionally, the cross-directional extent of serpentine cut 158 may substantially coincide with the

terminal outboard edge boundaries of the finger tab web, or may extend beyond the outboard edge boundaries of the finger tab material.

Having thus described the invention in rather full detail, it will be readily apparent that various changes and modifications can be made without departing from the spirit of the invention. All of such changes and modifications are contemplated as being within the scope of the invention, as defined by the subjoined claims.

Claims

1. A method for forming a plurality of fastener assemblies, comprising the steps of:
 - (a) providing a web of substrate material (140) along a longitudinal direction (132), said substrate web having a major facing surface (186) thereof and having first (142) and second (144) side edge regions thereof;
 - (b) providing for a component of a primary fastening means disposed across said major surface (186) of said substrate (140);
 - (c) attaching a first web of stiffening material (154) to said substrate web (140) at a location which is proximate said first side edge region (142) of said substrate web (140);
 - (d) attaching a second web of stiffening material (156) to said substrate web (140) at a location which is proximate said second side edge region (144) of said substrate web (140); and
 - (e) separating a medial region of said substrate web along a generally longitudinally extending serpentine line (158) to provide at least first (194) and second (196) fastener tab subassemblies.
2. The method as recited in claim 1, further comprising the step of dividing at least one of said first and second fastener tab subassemblies (194,196) to provide a plurality of fastening tabs.
3. The method as recited in claim 1 or 2, further comprising the steps of:
 - (f) attaching a first web of side panel material (130) to an outboard side region (198) of said first fastener tab subassembly (194) to form a first composite panel-and-fastener subassembly; and
 - (g) attaching a second web of side panel material (136) to an outboard side region (200) of said second fastener tab subassembly (196) to form at least a second composite panel-and-fastener subassembly.

4. The method as recited in claim 3, wherein said attaching step (f) is configured to provide a first web of side panel material (130) composed of an elastomeric material which is stretchable along a cross-direction (134) of said first side panel web (130); and said attaching step (g) is configured to provide a second web of side panel material (136) composed of an elastomeric material which is stretchable along a cross-direction (134) of said second side panel web (136). 5 10
5. The method as recited in claim 3 or 4, further comprising the step of dividing at least one of said first and second composite subassemblies to provide a plurality of panel-and-fastener components. 15
6. The method as recited in one of the preceding claims, wherein said step (c) comprises the step of attaching a first web of stiffening material (154) composed of a first web of release material (182), said first release web (182) having a first securement surface (188) and having a release surface (232) thereof which is located opposite said first securement surface (188), said release surface (232) constructed to releasably adhere to said component of said primary fastening means; and said step (d) comprises the step of attaching a second web of stiffening material (156) composed of a second web of release material (184), said second release web having a second securement surface (190) and having a second release surface (234) thereof which is located opposite said second securement surface (190), said second release surface (234) constructed to releasably adhere to said component of said primary fastening means. 20 25 30 35 40
7. The method as recited in one of claims 3 to 6, further comprising the step of connecting at least one of said panel-and-fastener assemblies to each of a pair of lateral side regions of a waistband portion (40) of an article. 45
8. The method as recited in one of the preceding claims, wherein said separating step (e) is configured to separate said composite along a serpentine line (158) having traversing sections which extend into a portion of each of said release webs. 50
9. The method as recited in claim 8, wherein said traversing sections of said serpentine line (158) include retroceding portions (168,170) thereof. 55
10. The method as recited in one of the preceding claims, wherein said providing step (b) includes the step of providing a fastening means which includes a layer of adhesive (54) disposed on said major surface (186) of said web of substrate material (140).
11. The method as recited in one of claims 1 to 9, wherein said providing step (b) includes the step of having disposed a fastening means comprising a cooperative component of an interlocking mechanical fastener on said major surface (186) of said web of substrate material (140).
12. The method as recited in claim 11, wherein said disposing step (b) includes the step of having disposed a cooperative hook component of a hook-and-loop type mechanical fastener system on said major surface (186) of said web of substrate material (140).
13. A method for forming a plurality of stretch panel fasteners, comprising the steps of:
 - (a) providing a first, substantially continuous web (130) of elastomerically stretchable material extending along a selected, longitudinal machine-direction (132), said material being elastomerically stretchable at least along a laterally extending cross-direction (134) which is substantially perpendicular to said machine-direction (132);
 - (b) providing at least a second, substantially continuous web (136) of elastomerically stretchable material extending along said machine-direction (132), said material being elastomerically stretchable at least along said cross-direction (134);
 - (c) spacing said second web (136) of stretchable material from said first web (130) of stretchable material by a selected distance (138) along said cross-direction (134);
 - (d) providing a substantially continuous web of substrate material (140) along said machine-direction (132) at a location which is between said first and second webs (130,136) of stretchable material, said substrate web (140) having laterally opposed, longitudinally extending side edge regions (142,144) thereof;
 - (e) attaching a longitudinally extending lateral side edge region of said first web of stretchable material to said first, side edge region of said substrate web (140) to provide a first bonded region;
 - (f) attaching a longitudinally extending lateral side edge region of said second web of

- stretchable material to said second, side edge region of said substrate web (140) to provide a second bonded region;
- (g) laying a first longitudinally extending web of stiffening material (154) at a position proximate said first bonded region, and connecting said first stiffening web (154) to at least said first web (130) of stretchable material;
- (h) laying a second longitudinally extending web of stiffening material (156) at a position proximate said second bonded region, and connecting said second stiffening web (156) to at least said second web (136) of stretchable material;
- (i) separating said substrate web (140) along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line (158) to provide an opposed pair of composite sub-assemblies (160,162); and
- (j) dividing at least one subassembly along a plurality of division lines (164) which extend substantially laterally across said subassembly to provide a plurality of combined panel-and-fastener components (166).
14. The method as recited in claim 13, wherein said separating step (e) includes the step of separating said substrate web (140) along said longitudinally extending medial region with a substantially regularly undulating serpentine line (158) having alternating, longitudinally retreating portions thereof.
15. The method as recited in claim 13 or 14, wherein said dividing step (j) includes the step of dividing at least one subassembly along a plurality of division lines (164) which extend substantially laterally across said subassembly to provide a plurality of longitudinally paired, combined panel-and-fastener components (178).
16. The method as recited in one of claims 13 to 15, further comprising the steps of:
- (k) of securing at least one of said longitudinally paired panel-and-fastener components (178) to each of two laterally opposed end regions of an appointed waistband section (40) of an article web to provide composite article web; and
- (l) severing said composite article web along a cross-direction thereof at a location which divides each of said longitudinally paired panel-and-fastener components (178) into two individual panel-and-fastener components.
17. The method as recited in one of claims 13 to 16, wherein said laying step (g) includes the step of overlapping said first longitudinally extending web of stiffening material (154) over said first bonded region, and connecting said first stiffening web (154) to said first web (130) of stretchable material and to said substrate web (140); and said laying step (h) includes the step of overlapping said second longitudinally extending web of stiffening material (156) over said second bonded region, and connecting said second stiffening web (156) to said second web (136) of stretchable material and to said substrate web (140).
18. The method as recited in one of claims 13 to 17, wherein said dividing step (j) includes the step of dividing at least one subassembly along a plurality of division lines (164) which extend substantially laterally across said subassembly to provide a plurality of longitudinally paired, combined panel-and-fastener components (210).
19. A method for forming a plurality of stretch panel fasteners, comprising the steps of:
- (a) providing a first, substantially continuous web (130) of elastomerically stretchable material extending along a selected, longitudinal machine-direction (132), said material being elastomerically stretchable at least along a laterally extending cross-direction (134) which is substantially perpendicular to said machine-direction (132);
- (b) providing at least a second, substantially continuous web (136) of elastomerically stretchable material extending along said machine-direction (132), said material being elastomerically stretchable at least along said cross-direction (134);
- (c) spacing said second web (136) of stretchable material from said first web (130) of stretchable material by a selected distance (138) along said cross-direction (134);
- (d) providing a substantially continuous web of substrate material (140) along said machine-direction (132) at a location which is between said first and second webs (130,136) of stretchable material, said substrate web (140) having laterally opposed, longitudinally extending side edge regions (142,144) thereof;
- (e) attaching a longitudinally extending lateral side edge region of said first web of stretchable material to said first, side edge region of said substrate web (140) to pro-

vide a first bonded region;

(f) attaching a longitudinally extending lateral side edge region of said second web of stretchable material to said second, side edge region of said substrate web (140) to provide a second bonded region; 5

(g) laying a first longitudinally extending web of stiffening material (154) at a position proximate said first bonded region, and connecting said first stiffening web (154) to at least said first web (130) of stretchable material; 10

(h) laying a second longitudinally extending web of stiffening material (156) at a position proximate said second bonded region, and connecting said second stiffening web (156) to at least said second web (136) of stretchable material; 15

(i) placing a web of release tape material (74) onto said substrate web (140); 20

(j) separating said substrate web (140) and said release tape web (74) along a longitudinally extending medial region thereof with a substantially regularly undulating serpentine separation line (158) to provide an opposed pair of composite subassemblies (160,162); 25

(k) dividing at least one subassembly along a plurality of division lines (164) which extend substantially laterally across said subassembly to provide a plurality of combined panel-and-fastener components (166); 30

(l) securing at least one of said panel-and-fastener components to each of two laterally opposed end regions of an appointed waistband section (174) of an article web (176) to provide a composite article web (180); and 35

(m) inwardly folding said first and second webs (130,136) of elastomerically stretchable material to anchor said release tape material (74) onto a selected surface of said article web (176). 40

said securing step (l) includes the step of securing at least one of said longitudinally paired panel-and-fastener components to each of two, laterally opposed end regions of said waistband section (174) of said article web (176) to provide said composite article web (180); and

further comprising the step of severing said composite article web (180) along a cross-direction thereof at a location which divides each of said longitudinally paired panel-and-fastener components into two individual panel-and-fastener components.

20. The method as recited in claim 19, wherein said separating step (j) includes the step of separating said substrate web (140) along said longitudinally extending medial region with a substantially regularly undulating serpentine line (158) having alternating, longitudinally retreating portions (168,170) thereof. 45

21. The method as recited in claim 19 or 20, wherein said dividing step (k) includes the step of dividing at least one subassembly along a plurality of division lines (164) which extend substantially laterally across said subassembly to provide a plurality of longitudinally paired, combined panel-and-fastener components, 50 55

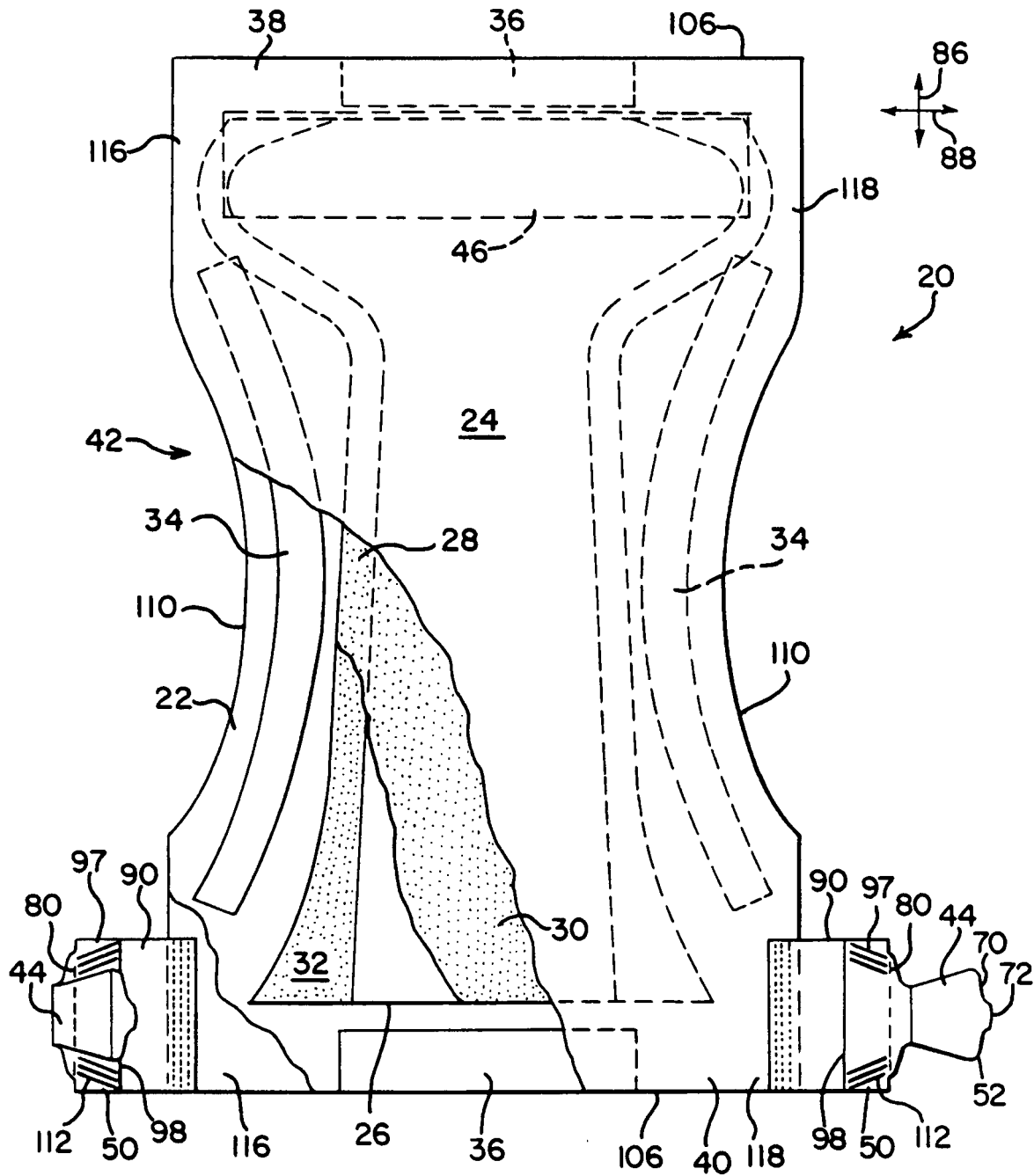


FIG. 1

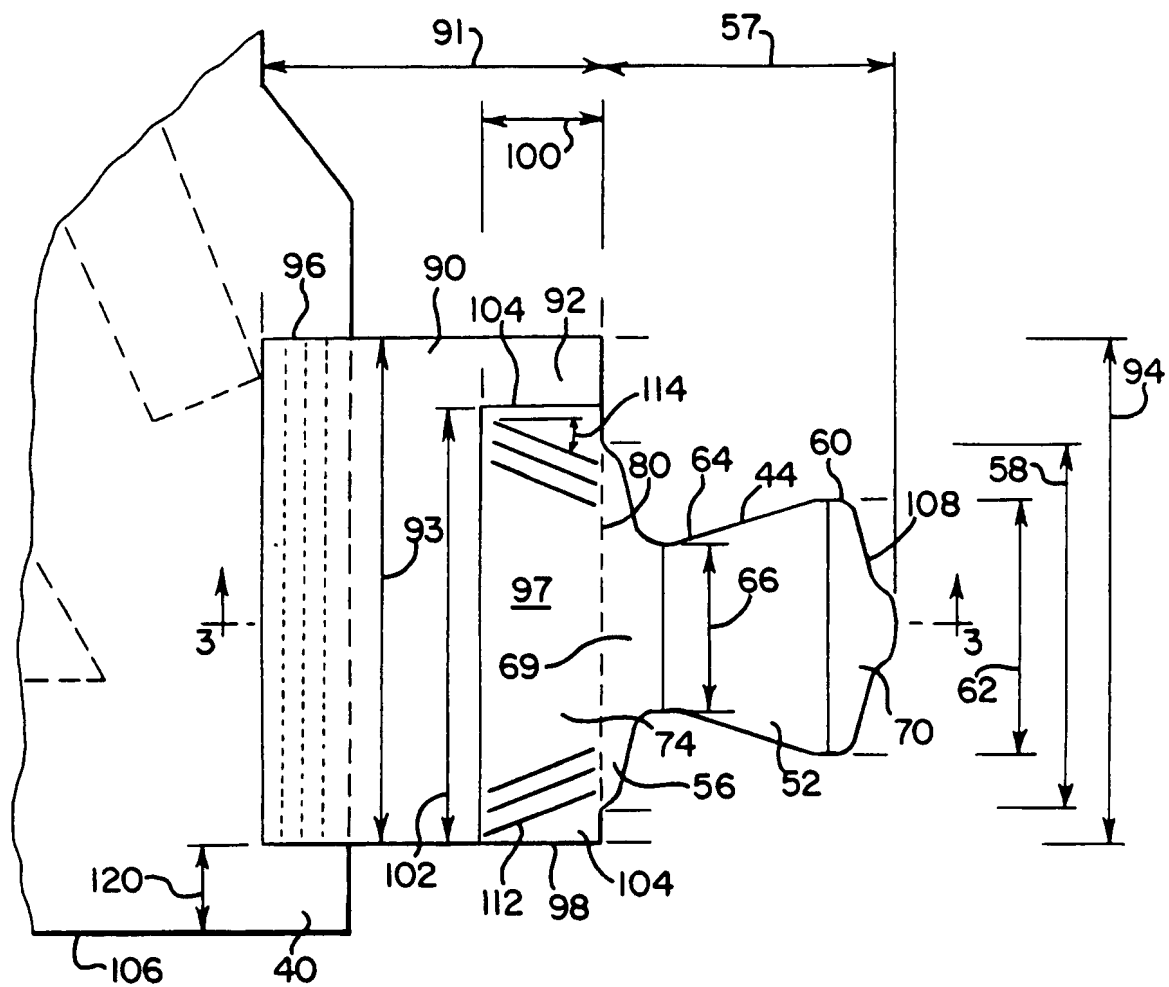


FIG. 2

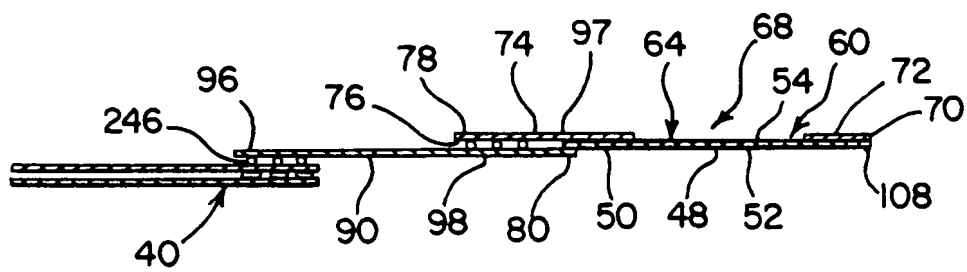


FIG. 3

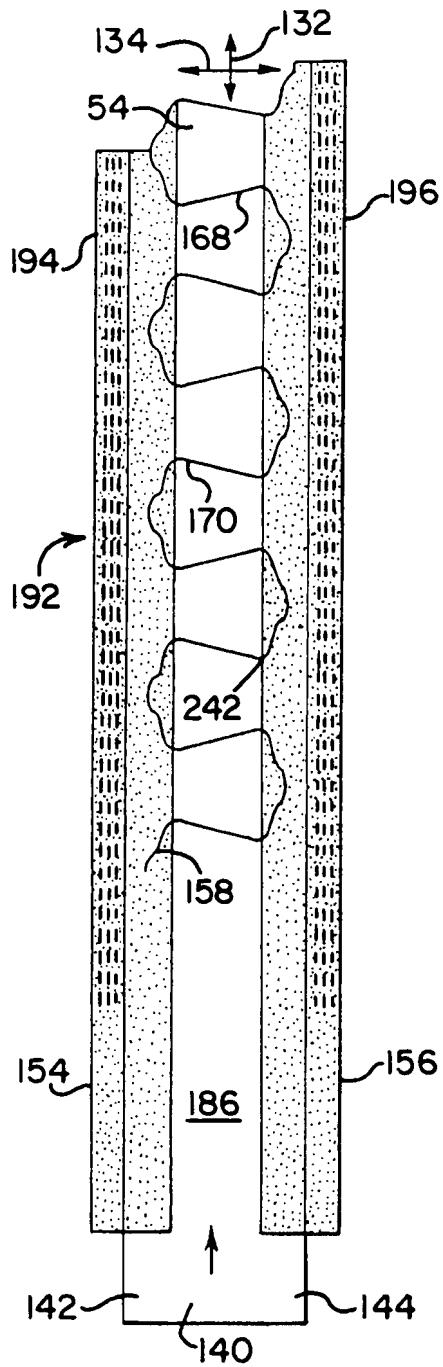


FIG. 4

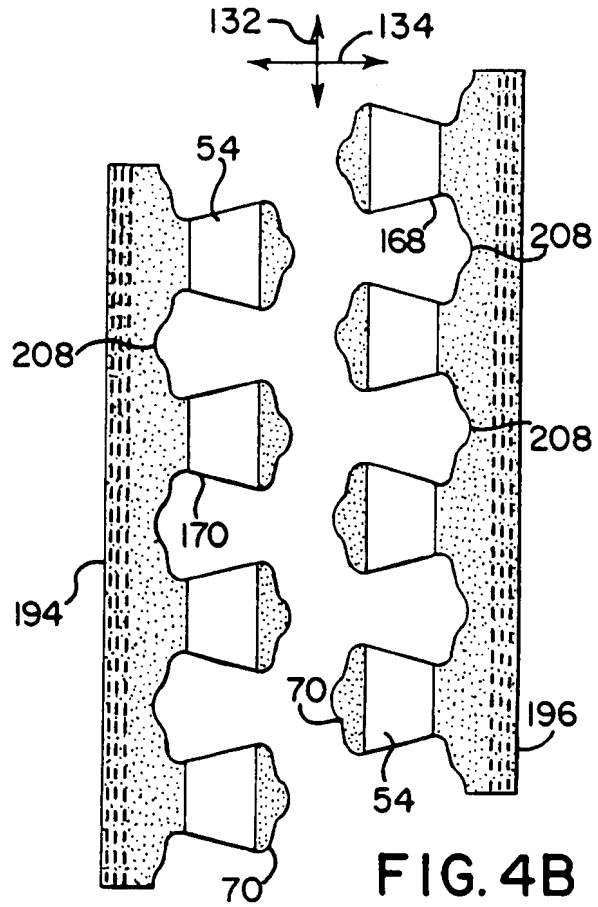


FIG. 4A

FIG. 4B

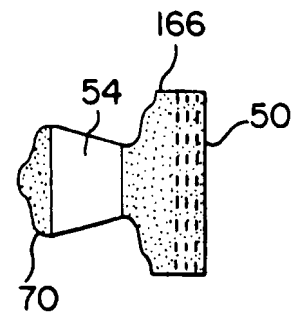
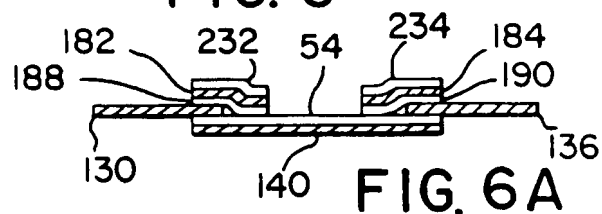
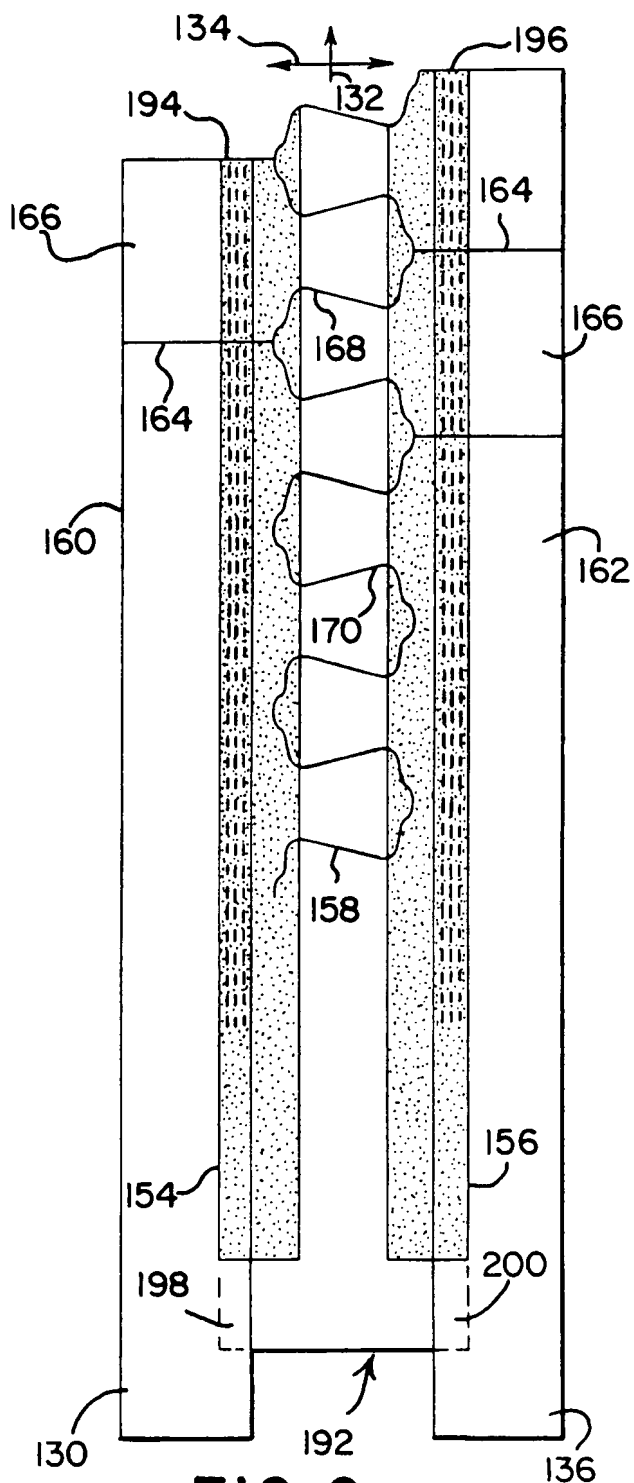
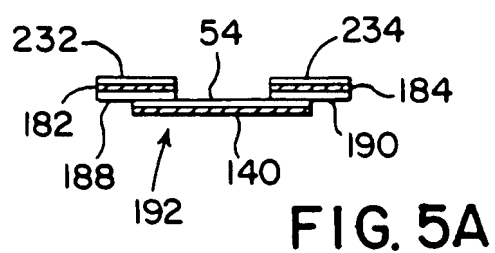
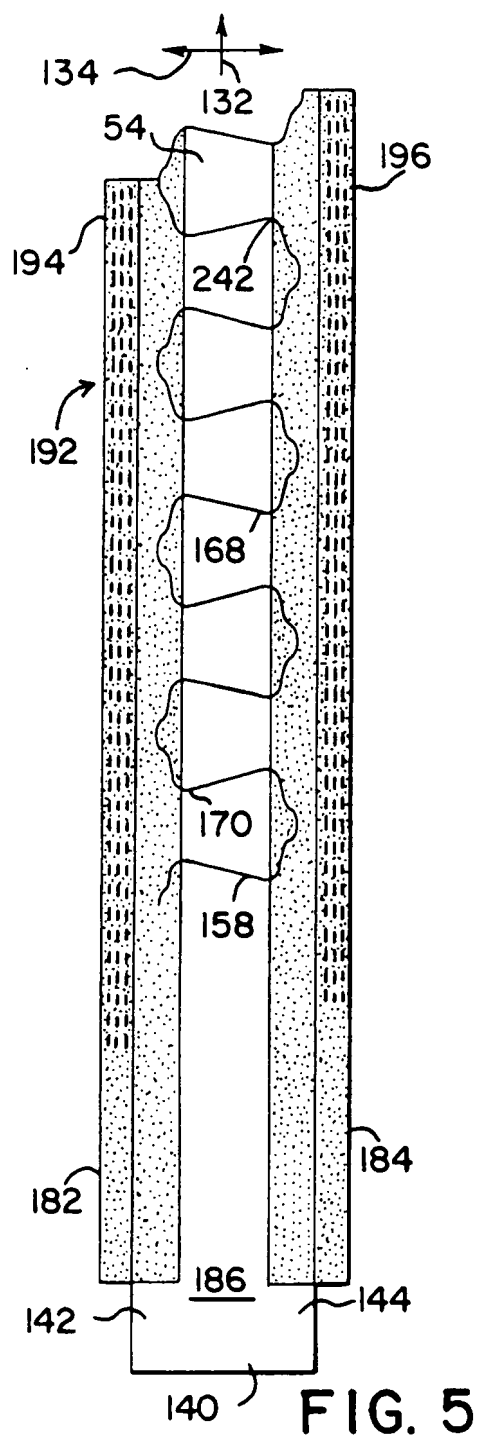


FIG. 4C



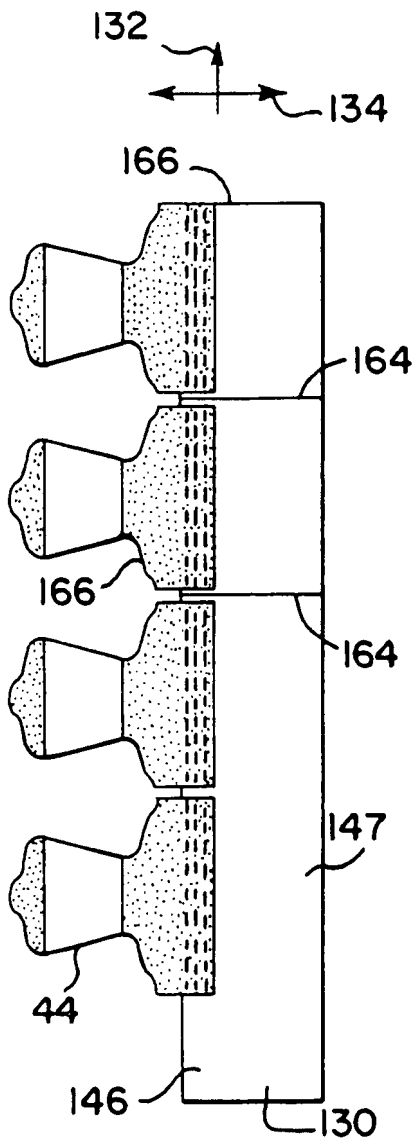


FIG. 7

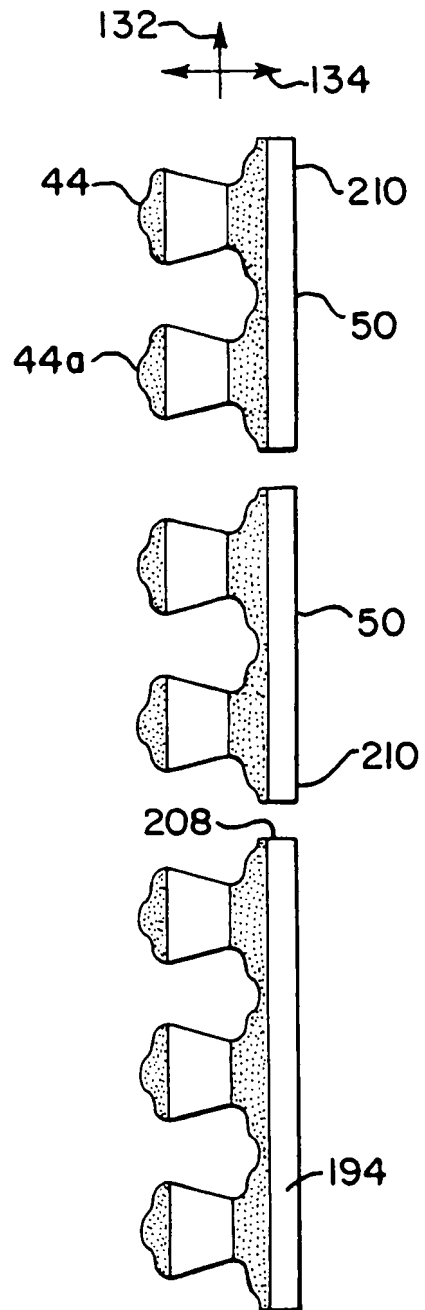


FIG. 8

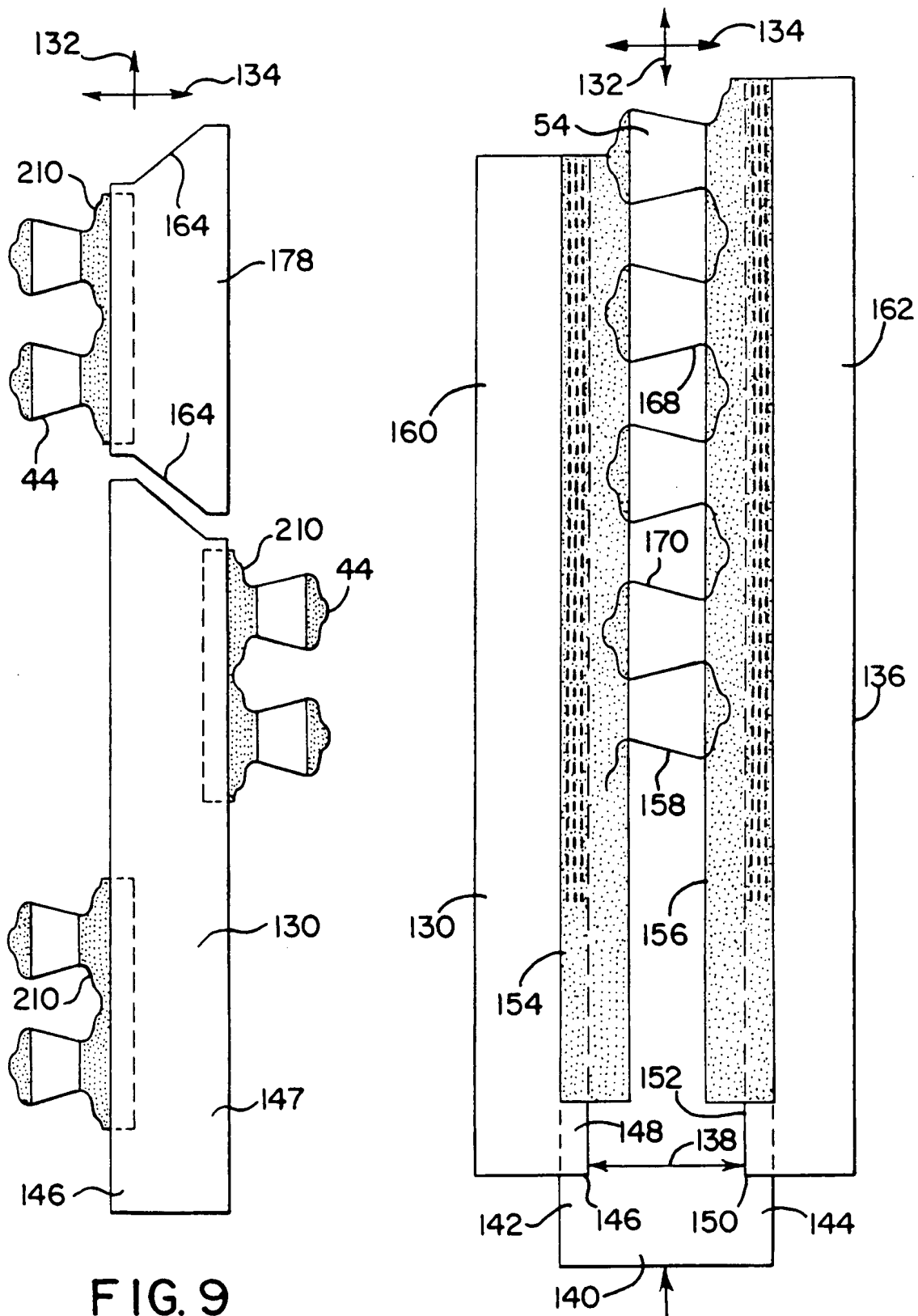


FIG. 9

FIG. 10

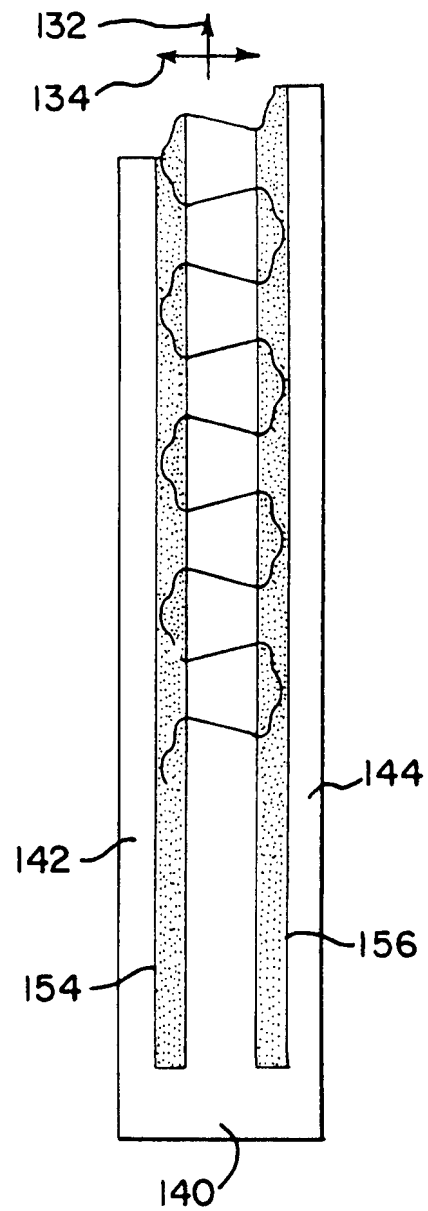
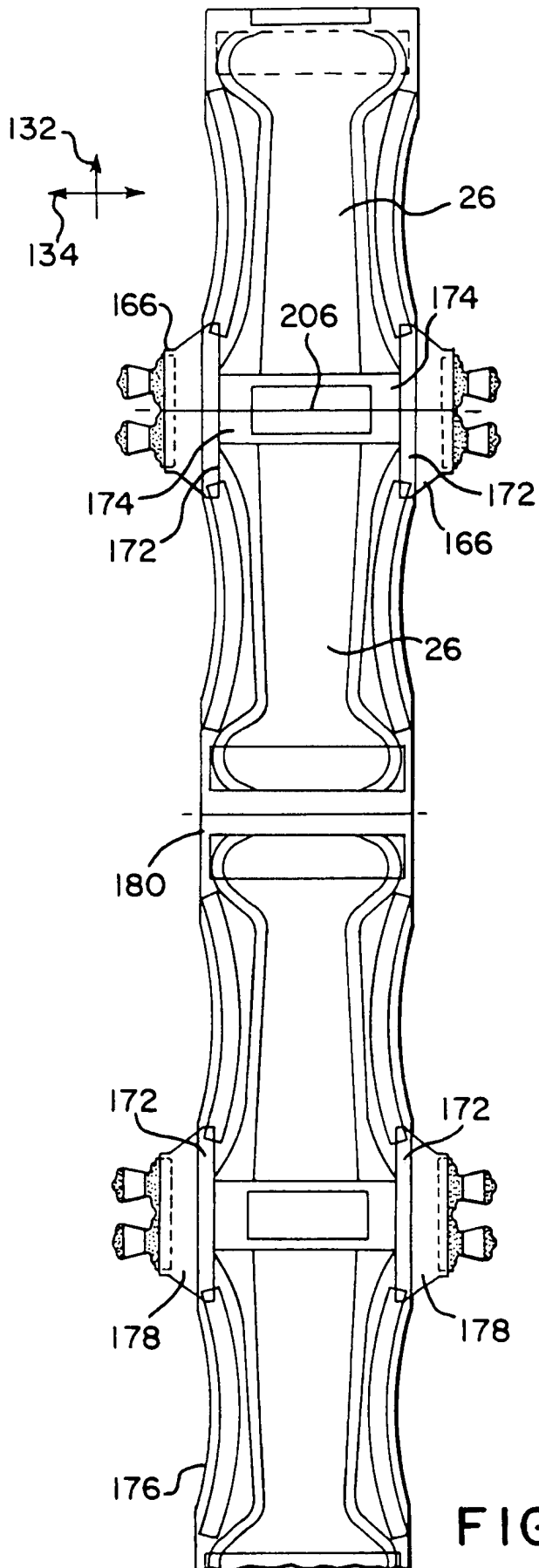


FIG. 15

FIG. 11

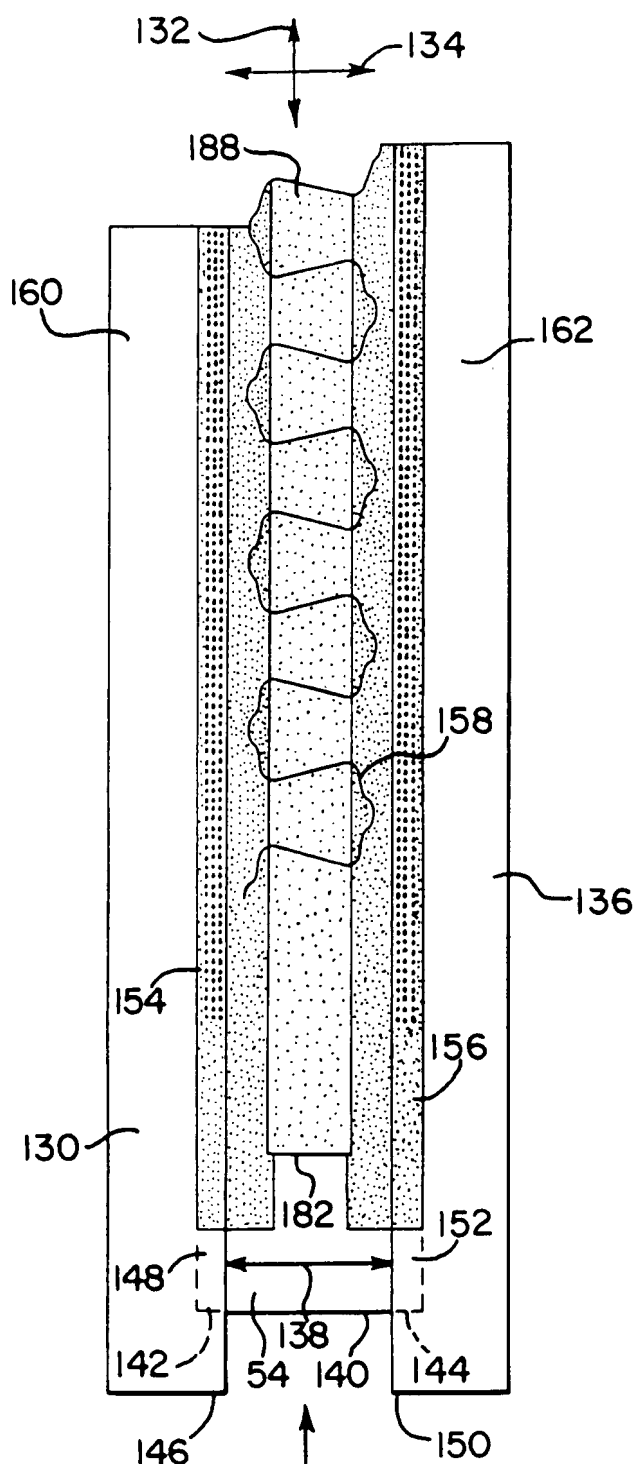


FIG. 12

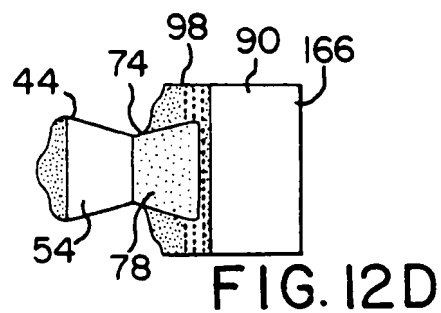


FIG. 12D

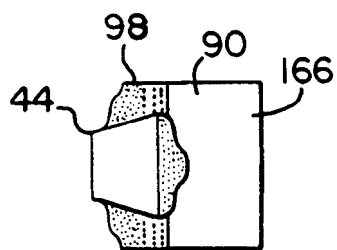


FIG. 12C

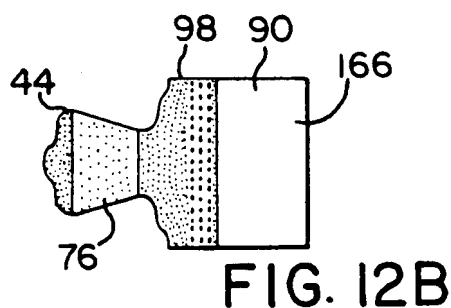


FIG. 12B

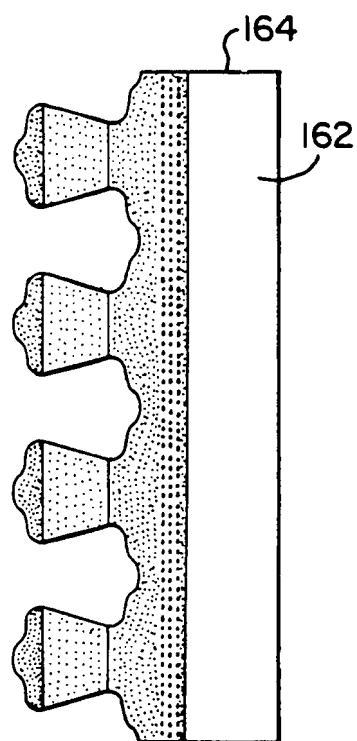


FIG. 12A

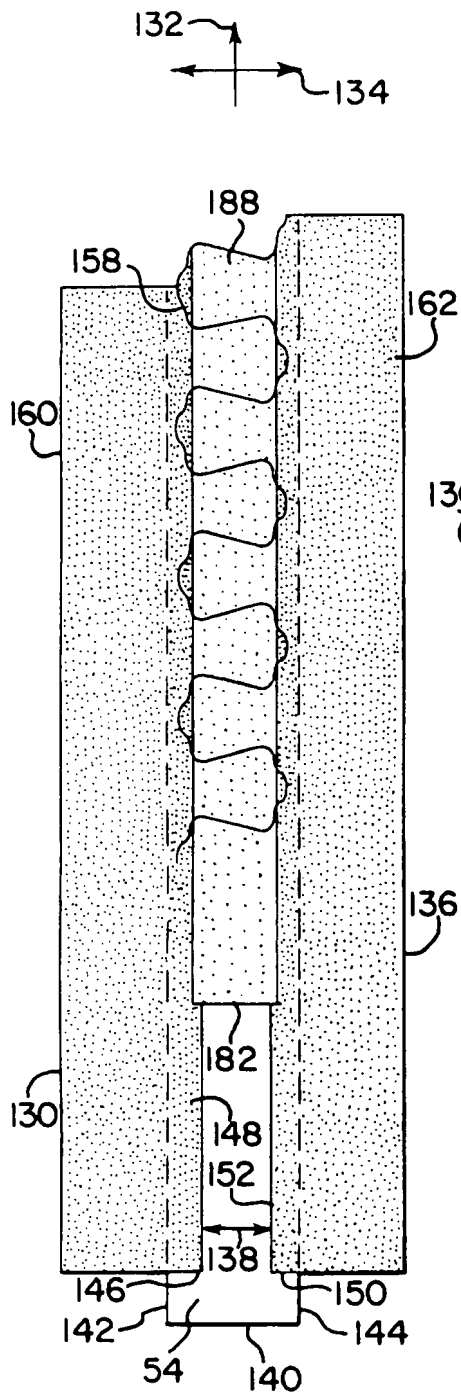


FIG. 13

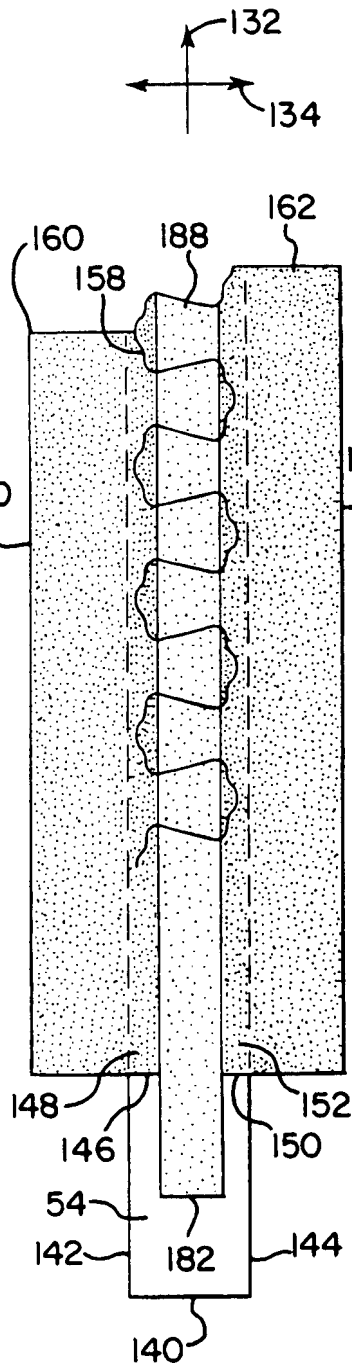


FIG. 13A

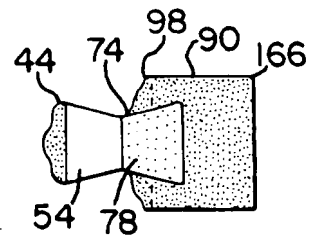


FIG. 13E

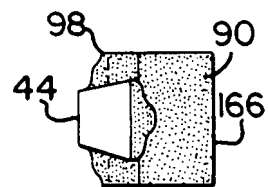


FIG. 13D

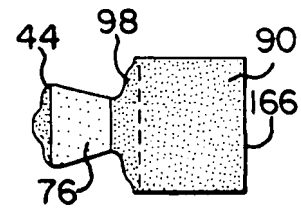


FIG. 13C

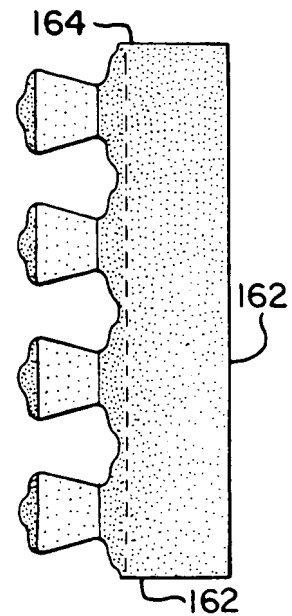
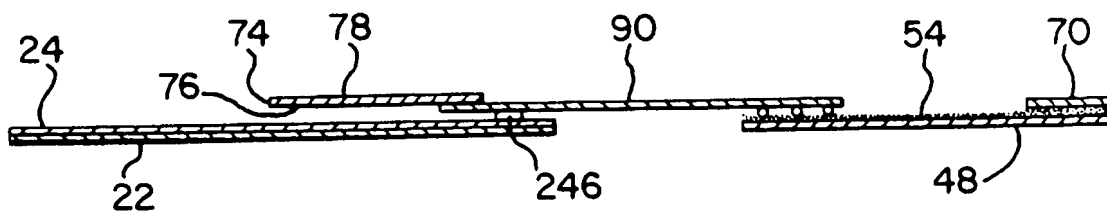
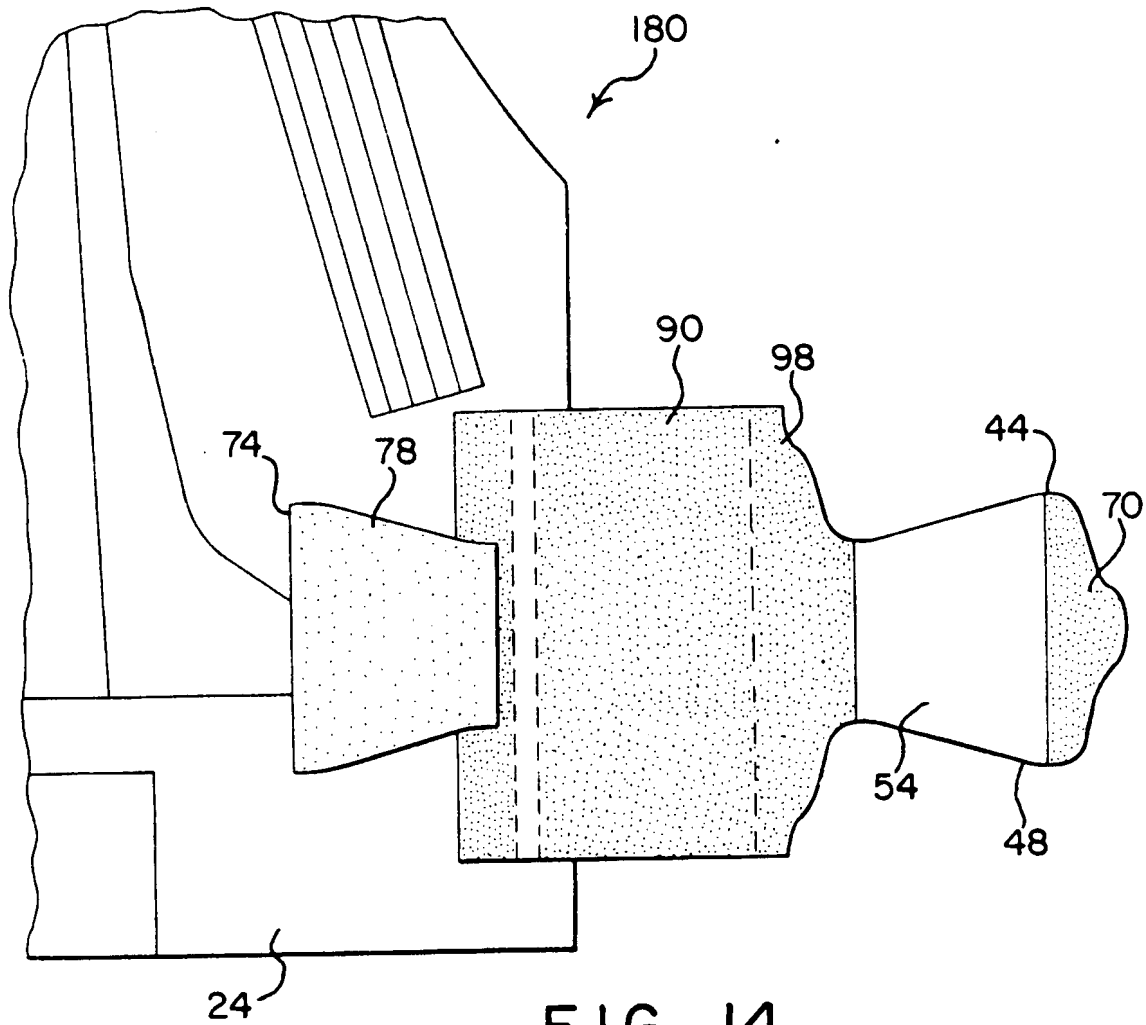


FIG. 13B



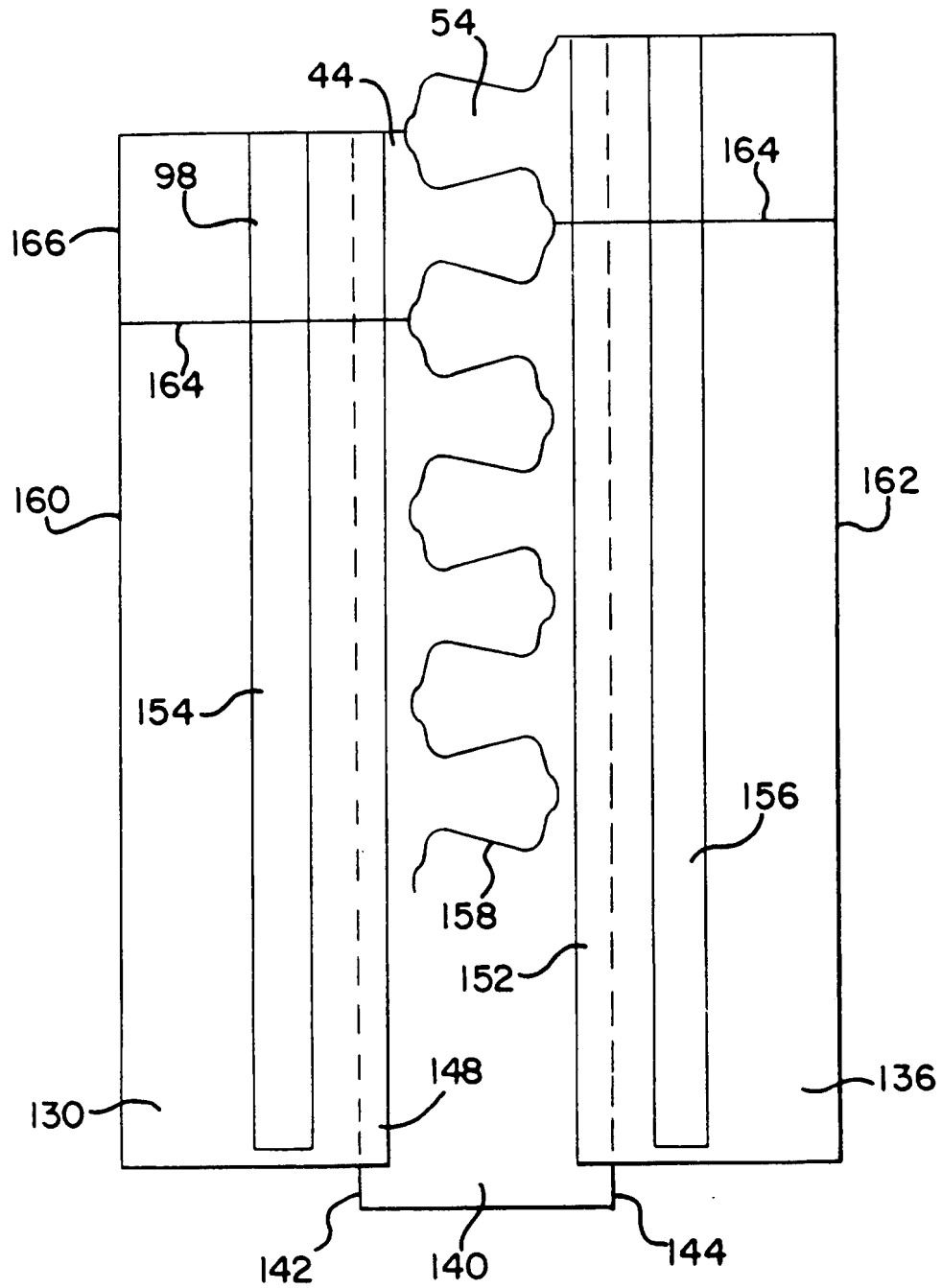


FIG. 16



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 9852

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	EP-A-0 233 704 (THE PROCTER & GAMBLE COMPANY) * page 13, line 1 - page 17, line 10; figures 1-7 *	1,7,8, 10,11	A61F13/58 B31D1/00 C09J7/02
A	FR-A-2 413 891 (BEGHIN-SAY) 3 August 1979 * page 8, line 30 - page 12, line 22; figures 3-8 *	1,2,4	
A	EP-A-0 379 850 (MÖLNLYCKE AB) * column 3, line 9 - column 5, line 25; figures 1-6 *	1,2	
A	EP-A-0 247 855 (MINNESOTA MINING AND MANUFACTURING COMPANY) * page 4, line 8 - page 8, line 31; figures 1-5 *	1,13	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A61F C09J B31D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		1 June 1995	Garnier, F
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,174	09/29/2003	Leigh E. Wood	58328US002	1946
32692	7590	03/15/2006	EXAMINER	
3M INNOVATIVE PROPERTIES COMPANY			RODRIGUEZ, RUTH C	
PO BOX 33427			ART UNIT	
ST. PAUL, MN 55133-3427			PAPER NUMBER	

3677

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/674,174

Applicant(s)

WOOD ET AL.

Examiner

Ruth C. Rodriguez

Art Unit

3677

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7-15 and 29-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-15 and 29-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/2/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 02 March 2006 has been considered for this Office Action.

2. The finality of the rejection of the last Office action is withdrawn in order to address Applicant's concerns.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 7-15 and 29-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Document EP 0 669 121 A1 (EP '121) in view of Dilnik et al. (US 5,656,111).

EP '121 discloses a closure system comprises a base tab (90), a carrier tab (44), a fastener component (C. 20, L. 36-58), an overlap region and a bonding tape (74). The base tab comprises an outer edge (80) and first and second major surfaces (Figs. 1-3). The carrier tab comprises first and second major surfaces, an inner edge (50) and an opposing outer edge (108). The inner edge and the outer edge define a length of the carrier tab (Figs. 1-3). The fastener component is attached to at least one of the first and second major surfaces of the carrier tab (C. 20, L. 36-58). The overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the base tab such that the outer edge of the base tab is located between the inner and outer edges of the carrier tab (Figs. 1-3). The bonding tape is adhesively attached to the second major surface of the base tab adjacent the overlap region (Figs. 1-3). The bonding tape is further adhesive attached or welded to the first major surface of the carrier tab within the overlap region (C. 18, L. 5-10). The inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab (Figs. 1-3). EP '121 fails to disclose that the bonding tape is adhesively attached and welded to the major surface of the carrier tab with the overlap region. However, Dilnik teaches a closure system comprises a carrier tab (10), a fastener component (18) and a bonding tape (26). The carrier tab comprises an outer edge (14) and a major surface (Fig. 4B). The fastener component is attached to the major surface of the carrier tab (Fig. 4B). The bonding tape is adhesively attached between the carrier tab and the fastener component (Figs. 4B). The bonding tape is further adhesive attached and welded to the carrier tab and the fastener component (C. 6, L. 18-23 and C. 7, L. 29-

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62). The use of adhesive and welding to join the carrier tab to the fastener component produce a system that possesses good shear adhesion and good peel adhesion (C. 7, L. 39-55). Therefore, it would have been obvious to one having ordinary skill in the art at the time of Applicant's invention to have a bonding tape that is further adhesively attached and welded as taught by Dilnik for the bonding tape that joins the base tab to the carrier tab for the closure system disclosed by EP '121 especially since EP '121 disclose the use of both systems to join the carrier tab to the bases tab and the system will possess good shear adhesion and good peel adhesion as taught by Dilnik.

No adhesive is located between the first major surface of the carrier tab and the second major surface of the base tab within the overlap region (Fig. 3).

At least a portion of the base tab exhibits elasticity (C. 16, L. 30-43).

The bonding tape comprises a layer of pressure sensitive adhesive facing the base tab and the carrier tab (C. 23, L. 31-58).

The carrier tab is inelastic (C. 21, L. 9-23).

The bonding tape is inelastic (C. 23, L. 31-58).

The base tab comprises an integral portion of a disposable garment (Fig. 1).

The fastener component is adhesively attached to the carrier tab (C. 20, L. 36-58).

The fastener component comprises a mechanical fastener component (C. 20, L. 36-58).

The bonding tape is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tape (Figs. 1-3).

The fastener component is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tape (Figs. 1-3).

Regarding claim 15, a combination of rejected claims 1, 3, 6, 8 and 9 will serve to reject claim 15 since claim 15 combines the limitations of all of the aforementioned claims.

The first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region (Figs. 1-3).

For claim 31, the same rejection of claim 15 serves to reject claim 31 since the base tab has at least a portion of the base tab that exhibits elasticity (C. 16, 30-43).

Regarding claim 43, a combination of rejected claims 1, 3, 6, 8, 9 and 29 will serve to reject claim 43 since claim 43 combines the limitations of all of the aforementioned claims.

Response to Arguments

5. Applicant's arguments, see pages 3 to 5, filed 27 February 2006, with respect to the rejection(s) of claim(s) 1-3, 7-15, 29 and 30 under EP '121 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Dilnik.

6. Applicant's arguments filed 17 October 2005 have been fully considered but they are not persuasive.

7. The argument presented by the Applicant for claims 31-43 is that EP '121 fails to disclose that the carrier tab is not attached to the base tab at the overlap region since it is silent about this limitation. The Examiner fails to be persuaded by this argument.

The fact that the reference is silent on whether it has an adhesive at the overlap region does not mean that EP '121 had an adhesive in this area. One having ordinary skill in the art at the time of Applicant's invention will not assume that there is an adhesive in this area just because the specifications and the drawings are silent about this feature especially in view of Figure 3 and the specifications that EP '121 does not provide any mention or showing of an adhesive material and it does not describe any attachment of the base tab and the carrier tab in the overlap region outside of the bonding tape.

Additionally, the Examiner points out that the use of an adhesive on the overlap portion is not necessary because as disclosed by EP '121 the bonding tape is the element joining the carrier tab and the base tab. It is unclear why one of ordinary skill in the art will provide an adhesive when the bonding tape is already joining the tabs to thereby increase the production costs due to the use of the adhesive. Finally, this argument fails to persuade because the Applicant fails to provide any criticality as to why this feature is considered the allowable subject matter for this invention. The specifications only recite "It is preferred that no adhesive be located between the major surface 121 of the carrier tab web 120 and the major surface 112 of the base tab web 110 within the

overlap region 118.” and it does not provide any advantage or unexpected result obtained from having no adhesive attachment in the overlap region.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawaguchi et al. (US 6,007,527), Richter et al. (US 6,363,587 B1) and Robertson et al. (US 6,736,804 B1) are cited to show state of the art with respect to closure systems having some of the features being claimed by the current application.

Dilnik (US 5,656,111, US 5,660,666, US 6, 406,467 B1 and US 6,627,289 B1) are cited to show state of the art with respect to the use of welding and adhesive to join members of a closure system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ruth C. Rodriguez whose telephone number is (571) 272-7070. The examiner can normally be reached on M-F 07:15 - 15:45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. J. Swann can be reached on (571) 272-7075.

Submissions of your responses by facsimile transmission are encouraged. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-6640.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ruth C. Rodriguez
Patent Examiner
Art Unit 3677

rcr
March 10, 2006



ROBERT J. SANDY
PRIMARY EXAMINER



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,174	09/29/2003	Leigh E. Wood	58328US002	1946
32692	7590	10/10/2006	EXAMINER	
3M INNOVATIVE PROPERTIES COMPANY			RODRIGUEZ, RUTH C	
PO BOX 33427			ART UNIT	
ST. PAUL, MN 55133-3427			PAPER NUMBER	
			3677	

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/674,174

Applicant(s)

WOOD ET AL.

Examiner

Ruth C. Rodriguez

Art Unit

3677

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,7-15 and 29-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,7-15 and 29-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 7-15 and 29-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Document EP 0 669 121 A1 (EP '121) in view of Dilnik et al. (US 5,656,111).

EP '121 discloses a closure system comprises a base tab (90), a carrier tab (44), a fastener component (C. 20, L. 36-58), an overlap region and a bonding tape (74). The base tab comprises an outer edge (80) and first and second major surfaces (Figs. 1-3). The carrier tab comprises first and second major surfaces, an inner edge (50) and an opposing outer edge (108). The inner edge and the outer edge define a length of the carrier tab (Figs. 1-3). The fastener component is attached to at least one of the first and second major surfaces of the carrier tab (C. 20, L. 36-58). The overlap region in which a portion of the first major surface of the carrier tab faces the second major surface of the base tab such that the outer edge of the base tab is located between the inner and outer edges of the carrier tab (Figs. 1-3). The bonding tape is adhesively attached to the second major surface of the base tab adjacent the overlap region (Figs.

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1-3). The bonding tape is further adhesive positioned or welded to the second major surface of the carrier tab within the overlap region (C. 18, L. 5-10). The inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab (Figs. 1-3).

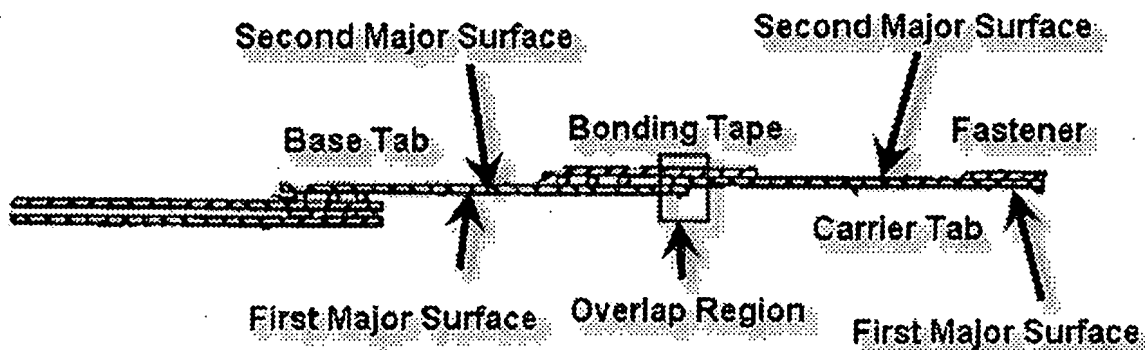


FIG. 3

EP '121 fails to disclose that the bonding tape is adhesively attached and welded to the major surface of the carrier tab with the overlap region. However, Dilnik teaches a closure system comprises a carrier tab (10), a fastener component (18) and a bonding tape (26). The carrier tab comprises an outer edge (14) and a major surface (Fig. 4B). The fastener component is attached to the major surface of the carrier tab (Fig. 4B). The bonding tape is adhesively attached between the carrier tab and the fastener component (Figs. 4B). The bonding tape is further adhesive attached and welded to the carrier tab and the fastener component (C. 6, L. 18-23 and C. 7, L. 29-62). The use of adhesive and welding to join the carrier tab to the fastener component produce a system that possesses good shear adhesion and good peel adhesion (C. 7, L. 39-55). Therefore, it would have been obvious to one having ordinary skill in the art at the time

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of Applicant's invention to have a bonding tape that is further adhesively attached and welded as taught by Dilnik for the bonding tape that joins the base tab to the carrier tab for the closure system disclosed by EP '121 especially since EP '121 disclose the use of both systems to join the carrier tab to the bases tab and the system will possess good shear adhesion and good peel adhesion as taught by Dilnik.

No adhesive is located between the first major surface of the carrier tab and the second major surface of the base tab within the overlap region (Fig. 3).

At least a portion of the base tab exhibits elasticity (C. 16, L. 30-43).

The bonding tape comprises a layer of pressure sensitive adhesive facing the base tab and the carrier tab (C. 23, L. 31-58).

The carrier tab is inelastic (C. 21, L. 9-23).

The bonding tape is inelastic (C. 23, L. 31-58).

The base tab comprises an integral portion of a disposable garment (Fig. 1).

The fastener component is adhesively attached to the carrier tab (C. 20, L. 36-58).

The fastener component comprises a mechanical fastener component (C. 20, L. 36-58).

The bonding tape is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tape (Figs. 1-3).

The fastener component is coextensive with a width of the carrier tab as measured transverse to the length of the carrier tape (Figs. 1-3).

Regarding claim 15, a combination of rejected claims 1, 3, 6, 8 and 9 will serve to reject claim 15 since claim 15 combines the limitations of all of the aforementioned claims.

The first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region (Figs. 1-3).

For claim 31, the same rejection of claim 15 serves to reject claim 31 since the base tab has at least a portion of the base tab that exhibits elasticity (C. 16, 30-43).

Regarding claim 43, a combination of rejected claims 1, 3, 6, 8, 9 and 29 will serve to reject claim 43 since claim 43 combines the limitations of all of the aforementioned claims.

For claim 44, the same rejection of claim 1 serves to reject claim 44 since the method of forming the device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight.

Response to Arguments

3. Applicant's arguments filed 17 July 2006 have been fully considered but they are not persuasive.

4. The Applicant argues that EP' 121 fails to disclose that the inner edge of the carrier tab is located between the bonding tape and the second major surface of the base tab. The Examiner fails to be persuaded by this argument. The Examiner

provides a copy of Figure 3 showing all the elements being claimed and demonstrating that EP '121 does meet the claim limitations since it is essentially a mirror image of the Figure 1 of this application.

5. In response to the Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. *In re Nomiya*, 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. *In re McLaughlin*, 170 USPQ 209 (CCPA 1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. *In re Bozek*, 163 USPQ 545 (CCPA 1969). In this case, EP '121 disclose the use of both systems to join the carrier tab to the bases tab but it fails to disclosed that both systems are used together, however, Dilnik is being used for the teaching that the use of both systems being used together to join the carrier tab to the base tab is known in the art. Additionally, Dilnik also teaches an advantage for using both systems together since they provides good shear adhesion and good peel adhesion that is being used as the motivation for making the combination between EP '121 and Dilnik.

6. The Applicant argues that EP '121 fails to disclose that the first major surface of the carrier tape and the first major surface of the base tab are not attached to other within the overlap region by citing some of the disclosure of EP '121. The Examiner

fails to be persuaded by this argument. The text cited the Applicant only states that the release tape is adhesively bonded to the substrate portion (carrier tab) and it does not state that the substrate portion is adhesively bonded to the base tab in the overlap region. The Examiner acknowledges that the disclosure also cites that "a Y-bond which can strengthen the assembly" is cited but this does not mean that the substrate portion is adhesively bonded to the base tab in the overlap region. The Examiner also fails to be persuaded by Applicant's arguments that there must be an attachment between the substrate portion and the base tab in the overlap region since EP '121 is citing that "the release tape 74 may optionally overlap and adhesively bond". Once again nowhere in EP '121 states that for this embodiment the substrate portion is attached to base tab and the term "may optionally overlap and adhesively bond" is used to describe the embodiment shown and does not mean that an additional attachment of the base tab to the substrate portion is necessary.

7. In response to Applicant's argument that Dilnik fails to teach the claim limitations since Dilnik uses both adhesive and thermal bonds to secure the two members while the Applicant uses an adhesive to position and then thermally bonds the members, the fact that Applicant uses an adhesives and thermally bonds for a different purpose does not alter the conclusion that its use in a prior art device would be prima facie obvious from the purpose disclosed in the reference. *In re Lintner*, 173 USPQ 365.

8. Finally for claim 44, the method of forming the device is not germane to the issue of patentability of the device itself. Therefore, this limitation has not been given patentable weight.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kawaguchi et al. (US 6,007,527), Richter et al. (US 6,363,587 B1) and Robertson et al. (US 6,736,804 B1) are cited to show state of the art with respect to closure systems having some of the features being claimed by the current application. Dilnik (US 5,656,111, US 5,660,666, US 6,406,467 B1 and US 6,627,289 B1) are cited to show state of the art with respect to the use of welding and adhesive to join members of a closure system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ruth C. Rodriguez whose telephone number is (571)

272-7070. The examiner can normally be reached on M-F 07:15 - 15:45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. J. Swann can be reached on (571) 272-7075.

Submissions of your responses by facsimile transmission are encouraged. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-6640.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ruth C. Rodriguez
Patent Examiner
Art Unit 3677

rcr
October 2, 2006


Katherine Mitchell
Primary Examiner



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,174	09/29/2003	Leigh E. Wood	58328US002	1946
32692 7590 02/06/2007 3M INNOVATIVE PROPERTIES COMPANY PO BOX 33427 ST. PAUL, MN 55133-3427			EXAMINER RODRIGUEZ, RUTH C	
			ART UNIT 3677	PAPER NUMBER
			MAIL DATE 02/06/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

**Advisory Action
Before the Filing of an Appeal Brief**

Application No.

10/674,174

Applicant(s)

WOOD ET AL.

Examiner

Ruth C. Rodriguez

Art Unit

3677

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 09 January 2007 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
(a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
(b) ☐ They raise the issue of new matter (see NOTE below);
(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
The status of the claim(s) is (or will be) as follows:
Claim(s) allowed: _____.
Claim(s) objected to: _____.
Claim(s) rejected: _____.
Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because:
See Continuation Sheet.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08) Paper No(s). _____.
13. ☐ Other: _____.


**ROBERT J. SANDY
PRIMARY EXAMINER**

Continuation of 11. does NOT place the application in condition for allowance because: The Applicant argues that EP 0 669 121 (EP '121) in combination with Dilnik fail to disclose the claimed invention in claims 29-43 because EP '121 fails to disclose that "the first major surface of the carrier tab and the second major surface of the base tab are not attached to each other within the overlap region" because EP '121 recites that "a terminal end portion of release tape 74 may optionally overlap and adhesively bond to an intermediate section of substrate member 48..." and "The resultant interconnection between substrate 48 and release tape 74 provides a Y-bond which strengthen the assembly and attachment of tape fastener 44 to the section of the diaper 20..." and serves to prove that the bond tab is attached to the carrier tab at the overlap region. This argument fails to persuade. The first recitation only serves to recite that outside of the other embodiments disclosed in EP '121 there is an optional embodiment as shown in Figures 2 and 3 where the overlap region is very small and that a bonding tape joins the base tab to the carrier tab. Especially since the disclosure only recites the bonding tape is adhesively joined to the carrier tab and that the bonding tape is adhesively joined to the base tab and there is no recitation for this particular embodiment that the carrier tab is adhesively attached to the base tab. The recitation of a Y-bond does not provide support for having an attachment between the base tab and the carrier tab because no details are provided for what is being considered as the Y-bond and one of ordinary skill in the art will not understand that there is an attachment between the base tab and the carrier tab just because of this recitation.

Regarding claim 44, the Applicant argues that the limitation "wherein the bonding tape is welded using a welding technique selected from the group consisting of chemical welding, dynamic mechanical welding, and combination thereof." does have patentable weight for the article claim. The Examiner fails to be persuaded because the claim is an article claim directed to a closure system and the claim only requires that the bonding tape is adhesively attached and welded to the second major surface of the base tab. The limitation in question is considered a method limitation and method limitations do not have patentable weight.

RELATED PROCEEDINGS APPENDIX

Serial No.: 10/674,174

Docket No.: 58328US002

There are no appeals or interferences known to Appellant's Representatives which would directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

CITED AUTHORITIES AND DOCUMENTS APPENDIX

Serial No.: 10/674,174

Docket No.: 58328US002

1. M.P.E.P. § 2143, 8th Ed., Rev. 5 (August 2006).
2. MPEP § 2143.01(V), 8th Ed., Rev. 5 (August 2006).
3. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).
4. MPEP § 2143.01(VI), 8th Ed., Rev 5. (August 2006).
5. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA1959).
6. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ 81 (Fed. Cir. 1986).
7. *In re Gorman*, 933 F2d 982, 18 USPQ 2d 1885 (Fed. Cir. 1991).
8. *In re Gulack*, 217 USPQ 401 (Fed. Cir. 1983).

20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143 - § 2143.03 for decisions pertinent to each of these criteria.

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). See MPEP § 2144 - § 2144.09 for examples of reasoning supporting obviousness rejections.

When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the combination of the teachings is proper. *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986). A statement of a rejection that includes a large number of rejections must explain with reasonable specificity at least one rejection, otherwise the examiner procedurally fails to establish a *prima facie* case of obviousness. *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Rejection based on nine references which included at least 40 prior art rejections without explaining any one rejection with reasonable specificity was reversed as procedurally failing to establish a *prima facie* case of obviousness.).

If the examiner determines there is factual support for rejecting the claimed invention under 35 U.S.C. 103, the examiner must then consider any evidence supporting the patentability of the claimed invention, such as any evidence in the specification or any other evidence submitted by the applicant. The ultimate determination of patentability is based on the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The legal standard of “a preponderance of evidence” requires the evidence to be more convincing than the evidence which is offered in opposition to it. With regard to rejections

under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not.

When an applicant submits evidence, whether in the specification as originally filed or in reply to a rejection, the examiner must reconsider the patentability of the claimed invention. The decision on patentability must be made based upon consideration of all the evidence, including the evidence submitted by the examiner and the evidence submitted by the applicant. A decision to make or maintain a rejection in the face of all the evidence must show that it was based on the totality of the evidence. Facts established by rebuttal evidence must be evaluated along with the facts on which the conclusion of obviousness was reached, not against the conclusion itself. *In re Eli Lilly & Co.*, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990).

See *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984) for a discussion of the proper roles of the examiner’s *prima facie* case and applicant’s rebuttal evidence in the final determination of obviousness. See MPEP § 706.02(j) for a discussion of the proper contents of a rejection under 35 U.S.C. 103.

2143 Basic Requirements of a *Prima Facie* Case of Obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

cementitious composition by driving the output pump at a capacity greater than the feed rate. The prior art reference taught that the feed means can be run at a variable speed, however the court found that this does not require that the output pump be run at the claimed speed so that air is drawn into the mixing chamber and is entrained in the ingredients during operation. Although a prior art device “may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.” 916 F.2d at 682, 16 USPQ2d at 1432.). See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references).

IV. FACT THAT THE CLAIMED INVENTION IS WITHIN THE CAPABILITIES OF ONE OF ORDINARY SKILL IN THE ART IS NOT SUFFICIENT BY ITSELF TO ESTABLISH *PRIMA FACIE* OBVIOUSNESS

A statement that modifications of the prior art to meet the claimed invention would have been “well within the ordinary skill of the art at the time the claimed invention was made” because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.).

V. THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

“Although statements limiting the function or capability of a prior art device require fair consideration, simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function.” *In re Dance*, 160 F.3d 1339, 1344, 48 USPQ2d 1635, 1638 (Fed. Cir. 1998) (Court held that claimed catheter for removing obstruction in blood vessels would have been obvious in view of a first reference which taught all of the claimed elements except for a “means for recovering fluid and debris” in combination with a second reference describing a catheter including that means. The court agreed that the first reference, which stressed simplicity of structure and taught emulsification of the debris, did not teach away from the addition of a channel for the recovery of the debris.).

Source: USPQ, 1st Series (1929 - 1986) > U.S. Court of Appeals, Federal Circuit > In re Gordon et al.,
221 USPQ 1125 (Fed. Cir. 1984)

In re Gordon et al., 221 USPQ 1125 (Fed. Cir. 1984)

221 USPQ 1125

In re Gordon et al.

U.S. Court of Appeals Federal Circuit

No. 83-1281

Decided May 10, 1984

733 F2d 900

Headnotes

PATENTS

[1] Patentability -- Anticipation -- Modifying references (► 51.217)

Question is not whether patentable distinction is created by viewing prior art apparatus from one direction and claimed apparatus from another, but whether it would have been obvious from fair reading of prior art reference as whole to turn prior art apparatus upside down; mere fact that prior art could be *modified by* turning apparatus upside down does not make modification obvious unless prior art suggested desirability of modification.

Particular Patents

Particular patents -- Blood Filters

Gordon and Sutherland, Blood Filter Assembly, Rejection of claims 1-3 and 5-7 *reversed*.

Case History and Disposition

Page 1126

Application for patent of Lucas S. Gordon and Karl M. Sutherland, Serial No. 124,312, filed Feb. 25, 1980. From decision rejecting claims 1-3 and 5-7, applicants appeal. Reversed.

Attorneys

James W. Geriak, Los Angeles, Calif. (Bradford J. Duft, Los Angeles, Calif., on the brief) for appellants.

John F. Pitrelli (Joseph F. Nakamura and John W. Dewhurst, on the brief) for Patent and Trademark Office.

Judge

Before Bennett and Miller, Circuit Judges and Skelton, Senior Circuit Judge.

Opinion Text

Opinion By:

Miller, Circuit Judge.

This appeal is from the decision of the United States Patent and Trademark Office ("PTO") Board of Appeals ("board") affirming the examiner's rejection of appellants' claims ¹1-3 and 5-7 as unpatentable under 35 U.S.C. § 103. We reverse.

¹ In application Serial No. 124,312, filed February 25, 1980, for a "Blood Filter."

The Invention

Appellants claim a "blood filter assembly" used during surgery and other medical procedures involving the handling of blood to remove clots, bone debris, tissue, or other foreign materials from blood before it is returned to a patient's body. Unlike blood filter assemblies widely used in the prior art, the device of the present invention permits both entry of the blood into, and ultimate discharge of the blood out of, the *bottom* end of the filter assembly, as shown below. ²

² Extraneous numbers have been removed from this and the subsequent drawing for clarification.

Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA at 1-800-372-1033.

The blood filter assembly comprises a shell 1 provided with blood inlet 3 and blood outlet 4. Between the blood inlet and the blood outlet is filter medium 6 positioned within the filter medium core 7.

The location of blood inlet 3 is such that the incoming blood is directed along a spirally upward path by the inner wall of the shell. Further, the location of the blood inlet at the bottom end of the filter assembly facilitates the removal of gas bubbles by allowing them to rise upwardly out of the blood. The gas bubbles so removed are released from the blood filter assembly by means of a gas vent 5 located in the region of the top end of the assembly.

Independent claim 1, from which the other appealed claims depend, is illustrative:

Blood filter assembly comprising:

- a. a shell having a first top end and a second bottom end,
- b. a blood inlet located in the region of said bottom end and opening into said bottom end,
- c. a blood outlet located in the region of said bottom end,
- d. a gas vent located in the region of said top end, and
- e. a blood filter medium located between said blood inlet and said blood outlet,

said blood inlet being located and configured in a manner capable of directing incoming blood in a

generally spiral path within said shell.

Claims 2, 3, and 5-7 further define the shape of the shell, the shape of the filter medium, and the nature of the material used as the filter medium.

Page 1127

Prior Art

The sole reference relied upon by the board is United States Patent No. 1,175,948, issued March 21, 1916, to French. French discloses a liquid strainer for removing dirt and water from gasoline and other light oils. As shown below, the inlet 4 and outlet 5 of the French device are both at the *top* end of the device.

Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA at 1-800-372-1033.

A continuous helical tooth or thread 8 is formed integral with the inner wall of shell 1 and imparts to the incoming liquid a whirling motion, which gives the liquid a scouring action to help clean the surface of a metal screen filter 21 and guides unwanted dirt and water downwardly into a pocket 9 in the bottom of the shell. A pair of shelves 10 and 11, projecting inwardly and downwardly from the inner wall of the shell, further assists the entrance of dirt and water into the pocket 9 and prevents their being drawn back into the main chamber 12. The reference expressly states, "gravity assists in the separation of heavier oils or water." A pet-cock 13, projecting vertically downward from the bottom of the pocket is used to remove the collected dirt and water periodically. The top of the liquid strainer is completely closed by gland 3 except for the inlet and outlet openings.

Board Opinion

The board held that the appealed claims were drawn to an apparatus which "would have at least been rendered *prima facie* obvious to one of ordinary skill in the art by the apparatus disclosed in French." The board's reasoning was that it would have been obvious to turn the French device upside down to have both the inlet and outlet at the bottom, rather than at the top; and to employ French's "pet-cock" as the claimed "gas vent." In the board's opinion, no patentable distinction was created by viewing French's apparatus from one direction and the claimed apparatus from another.

ANALYSIS

[1] We are persuaded that the board erred in its conclusion of *prima facie* obviousness. The question is not whether a patentable distinction is created by viewing a prior art apparatus from one direction and a claimed apparatus from another, but, rather, whether it would have been obvious from a fair reading of the prior art reference as a whole to turn the prior art apparatus upside down. French teaches a liquid strainer which relies, at least in part, upon the assistance of gravity to separate undesired dirt and water from gasoline and other light oils. Therefore, it is not seen that French would have provided any motivation to one of ordinary skill in the art to employ the French apparatus in an upside down orientation. The mere fact that the prior art could be so *modified* would not have made the modification obvious unless the prior art suggested the desirability of the modification. See *Carl Schenck, A.G. v. Nortron Corp.*, 713 F.2d 782, 787, 218 USPQ 698, 702 (Fed.Cir. 1983), and *In re Sernaker*, 702 F.2d 989, 995-96, 217 USPQ 1, 6-7 (Fed.Cir. 1983), both citing *In re Imperato*, 486 F.2d 585, 587, 179 USPQ 730, 732 (CCPA 1973).

Indeed, if the French apparatus were turned upside down, it would be rendered inoperable for its intended purpose. The gasoline to be filtered would be trapped in pocket 9, and the water French seeks to separate would flow freely out of the outlet 5. Further, unwanted dirt would build up in the space between

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the wall of shell 1 and screen 21, so that, in time, screen 21 would become clogged unless a drain valve, such as pet-cock 13, were re-introduced at the new "bottom" of the apparatus. See *In re Schulpen*, 390 F.2d 1009, 1013, 157 USPQ 52, 55 (CCPA 1968). In effect, French teaches away from the board's proposed modification.

Because the PTO has failed to establish a prima facie case of obviousness, the rejection of claims 1-3 and 5-7 as unpatentable under 35 U.S.C. § 103 must be reversed .³

³ Because our holding that the PTO has failed to establish a prima facie case is dispositive, it is unnecessary to reach other arguments raised by appellants.

Reversed

- End of Case -

VI. THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (Claims were directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. Patentee taught the device required rigidity for operation, whereas the claimed invention required resiliency. The court reversed the rejection holding the “suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate.” 270 F.2d at 813, 123 USPQ at 352.).

2143.02 Reasonable Expectation of Success Is Required

OBVIOUSNESS REQUIRES ONLY A REASONABLE EXPECTATION OF SUCCESS

The prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (Claims directed to a method of treating depression with amitriptyline (or nontoxic salts thereof) were rejected as *prima facie* obvious over prior art disclosures that amitriptyline is a compound known to possess psychotropic properties and that imipramine is a structurally similar psychotropic compound known to possess antidepressive properties, in view of prior art suggesting the aforementioned compounds would be expected to have similar activity because the structural difference between the compounds involves a known bioisosteric replacement and because a research paper comparing the pharmacological properties of these two compounds suggested clinical testing of amitriptyline as an antidepressant. The court

sustained the rejection, finding that the teachings of the prior art provide a sufficient basis for a reasonable expectation of success.); *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Claims were directed to a process of sterilizing a polyolefinic composition with high-energy radiation in the presence of a phenolic polyester antioxidant to inhibit discoloration or degradation of the polyolefin. Appellant argued that it is unpredictable whether a particular antioxidant will solve the problem of discoloration or degradation. However, the Board found that because the prior art taught that appellant’s preferred antioxidant is very efficient and provides better results compared with other prior art antioxidants, there would have been a reasonable expectation of success.).

AT LEAST SOME DEGREE OF PREDICTABILITY IS REQUIRED; APPLICANTS MAY PRESENT EVIDENCE SHOWING THERE WAS NO REASONABLE EXPECTATION OF SUCCESS

Obviousness does not require absolute predictability, however, at least some degree of predictability is required. Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) (Claims directed to a method for the commercial scale production of polyesters in the presence of a solvent at superatmospheric pressure were rejected as obvious over a reference which taught the claimed method at atmospheric pressure in view of a reference which taught the claimed process except for the presence of a solvent. The court reversed, finding there was no reasonable expectation that a process combining the prior art steps could be successfully scaled up in view of unchallenged evidence showing that the prior art processes individually could not be commercially scaled up successfully.). See also *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207-08, 18 USPQ2d 1016, 1022-23 (Fed. Cir.), *cert. denied*, 502 U.S. 856 (1991) (In the context of a biotechnology case, testimony supported the conclusion that the references did not show that there was a reasonable expectation of success.); *In re O’Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (The court held the claimed method would have been obvious

Source: USPQ, 1st Series (1929 - 1986) > U.S. Court of Customs and Patent Appeals > In re RATTI, 123 USPQ 349 (C.C.P.A. 1959)

In re RATTI, 123 USPQ 349 (C.C.P.A. 1959)

123 USPQ 349

In re RATTI

U.S. Court of Customs and Patent Appeals

Appl. No. 6452

Decided September 30, 1959

270 F2d 810

Headnotes

PATENTS

[1] Evidence—Judicial notice (► 36.20)

It is common knowledge that resilient deformable materials such as natural or synthetic rubber are incompressible, i.e., while they may be deformed, this can occur only if design and mounting of part permits resilient material to change its shape in response to applied forces.

[2] Patentability — Anticipation — Combining references (► 51.205)

Patentability — Anticipation — Modifying references (► 51.217)

Combination of J patent with C patent is not proper ground for rejection of claims since combination would require substantial reconstruction and redesign of elements shown in C as well as change in basic principles under which C construction was designed to operate; once applicant taught how this could be done, redesign may, by hindsight, seem to be obvious to one having ordinary skills in art, but, when viewed as of time applicant's invention was made, and without benefit of applicant's disclosure, court finds nothing in art of record which suggests applicant's novel device.

[3] Court of Customs and Patent Appeals—Issues determined—Ex parte patent cases (► 28.203)

Rejection *reversed* by Board is not before court.

[4] Patentability—In general (► 51.01)

Novelty alone is not enough for patentability.

[5] Patent grant—In general (► 50.01)

Applicant is entitled to patent, under the statutes, unless one of the prohibitory provisions of statutes applies.

[6] Patentability—In general (► 51.01)

Patentability—Evidence of—In general (► 51.451)

Patentability—Utility (► 51.75)

Statutory requirements for patentability are novelty, usefulness, and unobviousness, as provided in 35

U.S.C. 101, 102, and 103; while proof that invention is better or possesses advantages may be persuasive of existence of any one or all of the requirements, and hence be indicative of patentability, Congress has not made such proof a prerequisite to patentability; moreover, Congress has never required that each and every patentable invention involve "progress" in the sense that it must possess some definite advantage over prior art; hence, it is improper to reject claim on ground that it does not possess some definite advantage over prior art; while R.S. 4893 may be said to have given Commissioner some discretion in refusing to grant patent on an otherwise patentable invention unless "the same is sufficiently useful and important," Congress removed this provision from new 35 U.S.C. 131; this is further indication that it is intent of Congress that patentability be determined solely by sections 101, 102, and 103.

[7] Court of Customs and Patent Appeals—In general (► 28.01)

Pleading and practice in Patent Office—In general (► 54.1)

It is duty of Patent Office and Court of Customs and Patent Appeals to apply law as Congress wrote it.

Particular Patents

Particular patents—Oil Seal

Ratti, Oil Seal, claims 1, 4, 7, and 10 of application allowed.

Case History and Disposition

Appeal from Board of Appeals of the Patent Office.

Application for patent of Ferdinand J. Ratti, Serial No. 359,325, filed June 3, 1953; Patent Office Division 52. From decision rejecting claims 1, 4, 7, and 10, applicant appeals. Reversed; Kirkpatrick, Judge, dissenting with opinion in which Worley, Chief Judge, joins.

Attorneys

CROMWELL, GREIST & WARDEN (RAYMOND L. GREIST of counsel) both of Chicago, Ill., for appellant.

CLARENCE W. MOORE (S. WM. COCHRAN of counsel) for Commissioner of Patents.

Judge

Before WORLEY, Chief Judge, RICH, MARTIN, and SMITH, Associate Judges, and KIRKPATRICK, Judge *.

* United States Senior District Judge for the Eastern District of Pennsylvania, designated to participate in place of Judge O'CONNELL, pursuant to the provisions of Title 28, United States Code, Section 294(d).

Opinion Text

Opinion By:

SMITH, Judge.

This is an appeal from the decision of the Board of Appeals of the United States Patent Office affirming the rejection by the Primary Examiner of claims 1, 4, 7 and 10 of appellant's application serial No. 359,325, filed June 3, 1953, for a patent on an "Oil Seal" for sealing the space between a bore in a housing and a relatively movable shaft centrally located in the bore.

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Claim 1 is representative of claims 4 and 7 and reads:

1. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located shaft, comprising an annular bore-engaging mounting portion of resiliently deformable material for endwise insertion in and statically sealed engagement with the bore in the housing, an annular shaft-engaging portion connected with said bore-engaging portion for running engagement with the shaft, and a *metal ring* located adjacent one end of said bore-engaging portion, said ring being *provided with a plurality of axially extending outwardly biased spring fingers in outwardly clamped engagement with said bore-engaging portion* inwardly of the outer periphery of the latter, and said ring being *also provided* outwardly of said bore-engaging portion *with means for detachably connecting the ring to the housing* outwardly of the bore in the latter. (Emphasis ours.)

Claim 10 differs from the other claims on appeal and reads:

10. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located shaft, comprising a sealing ring having an outer bore-engaging portion of resiliently deformable material, which portion is of somewhat larger diameter than the bore in the housing, for press-fit insertion in the bore, and a *metal retaining ring* associated with the sealing ring, said retaining ring being connected with the sealing ring and being provided outwardly of the latter *with resiliently yieldable hook formations which are adapted to be sprung into interlocking engagement with a complementary formation associated with the housing* outwardly of the bore, which engagement acts to prevent axial displacement of the sealing ring relative to the bore in the housing. (Emphasis ours.)

The references in the case are:

Roth, 1,546,942, July 21, 1925.

Norton, 1,951,034, Mar. 1, 1934.

Jepson, 2,544,324, Mar. 6, 1951.

Chinnery et al. (British), 578,526, July 2, 1946.

Appellant's shaft seal comprises an annular sealing member of resilient deformable material which is adapted to be inserted into a cylindrical bore surrounding a relatively movable shaft. The inner portion of the sealing member is provided with a flexible lip which is held in engagement with the shaft by a garter spring. In the outer portion of the sealing member, an annular slot is provided which is concentric with and spaced from the outer periphery of the sealing member. This slot extends axially from the end of the member and provides a pocket in which the axially extending outwardly biased spring fingers of a metallic attaching ring are located. This construction permits the spring fingers to exert a force on the resilient material in the direction of the annular wall of the bore to provide and maintain a snug engagement between the outer surface of the resilient member and the inner surface of the bore. The metallic attaching ring is also provided with radially extending resilient hooks located outwardly of the bore engaging portion of the resilient member. The housing is provided with a complementary formation

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outwardly of the bore which is engaged by the resilient hooks to provide a snap-on connection between the bore and the seal.

The Roth and Norton patents were relied upon by the examiner in rejecting claim 10, and since both references were considered by the board, we have included them in our consideration of this case. Roth shows a gasket structure for steam train line hose couplings. Norton shows an adjustable repair clamp for bell and spigot joints in which there is provided a sheet metal bridge piece "preferably of spring material." The bridge piece is sprung into interlocking engagement with a structural portion of the clamp and exerts its force on a resilient packing ring which, if desired, may be cemented to it.

The Chinnery et al. patent is the reference principally relied upon by the Patent Office. It shows a housing provided with a bore surrounding a centrally located shaft. A reinforced and "stiffened" sealing member formed of a material such as rubber, is press fitted into the space between the bore and the shaft. The sealing member has an inner lip held in contact with the shaft by a garter spring. The bore engaging portion of the sealing member is "stiffened" by an axially extending cylindrical sheet metal casing which acts as a reinforcing member for a definite purpose which is described by Chinnery et al. as follows:

Owing to the limited radial space within which the oil seal is to be accommodated, the holding portion of the oil seal cannot be stiffened by being massive. Consequently the holding portion of the present oil seal is stiffened in the known manner by a reinforcement, which may either encase or line, or alternatively constitute, such holding portion and therefore makes the press-fitting contact with the machine part stationary relatively thereto, *or may be an internal reinforcement in the sense that it does not make press-*

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fitting contact with the machine part stationary relatively thereto. (Emphasis ours.)

In Fig. 8 Chinnery et al. shows a radially extending flange at the outer edge of a reinforcing member of the internal reinforcement type which flange extends beyond the sealing member "to such an extent as to serve as a means of attachment of the oil seal to the housing *i*, additional to the interference press fit of the holding portion *a* in the housing recess *g*." The aforesaid flange is shown attached to the housing by screws or bolts.

The Jepson patent relates to a gasket for sealing the space between the upper and lower vessels of a vacuum-type coffee maker. The gasket is an annular rubber member attached to the lower part of the upper vessel and is designed to fit into the upper part of the lower one. Located in a groove in the gasket is a sleeve member provided with axially and downwardly extending spring fingers which are so biased radially as to urge the lower peripheral portion of the gasket outwardly, thus effecting a tight engagement with the mouth of the lower vessel.

Claims 1, 4, and 7 stand rejected on Chinnery et al. in view of Jepson, on the ground that it would not require "invention" to replace the cylindrical sheet metal reinforcing member, which is secured to the Chinnery et al. sealing member, by an annular set of outwardly biased spring fingers shown by Jepson.

The problems which were solved by appellant's invention existed in this art at the time of his invention despite the Chinnery et al. disclosures. It was appellant rather than Chinnery et al. who provided the art with a shaft seal in which the resilient element of the seal could be readily inserted into a bore in the housing so that it could be removed from the bore and replaced by a new sealing element without mutilation of the sealing surface of the bore. This is particularly important, the specification points out, where the bore is formed in light metal alloys such as are used in aircraft engines and which are relatively soft and easily damaged. In appellant's oil seal, the resilient seal is so constructed that when mounted in the bore, it will establish and maintain a fluid tight relationship between the outer peripheral surface of the resilient seal member and the inside of the bore. Where either natural or synthetic rubber is used as the resilient sealing member in such seals, the rubber in time will take a set or lose its resiliency at least to the extent that the seals soon become ineffective to prevent leakage of oil. When subjected to mechanical

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pressures and heat, such a rubber sealing element loses its sealing effectiveness at an accelerated rate. The problems in the oil sealing art arising from such use of resilient sealing elements appear to have persisted because of the failure of the art to recognize these characteristics of the rubber sealing element and to so design the resilient element and the mounting therefor as to assure holding the outer circumference of the resilient sealing element in static oil-sealing contact with the inner circumference of the bore in which it is inserted.

Appellant's seal differs from the art of record in at least three respects:

- (1) The provision of the annular slot which extends axially inward from one end of the resilient sealing element. This feature is claimed as part of the combination set forth in claim 4.
- (2) The outwardly biased resilient spring means or fingers inserted in the resilient sealing element. These means are claimed as part of the combination of claims 1, 4 and 7.
- (3) The "snap-on" connector which holds the resilient sealing element and engages with a complementary formation associated with the housing outwardly of the bore. This feature is in the combination of claim 10.

The patents cited by the examiner, either alone or in combination, do not disclose a resilient shaft sealing element having these features.

[1] It is common knowledge that resilient deformable materials such as either natural or synthetic rubber are incompressible, that is, while they may be deformed, this can occur only if the design and mounting of the part permits the resilient material to change its shape in response to the applied forces.

The seal construction disclosed in Chinnery et al. is such that the "interference press fit" which that patent calls for is alone relied on to keep the seal tight. There is nothing in the Chinnery et al. patent to show how the resilient sealing element is *maintained* in resilient contact with the bore otherwise than by the resiliency of the rubber. If and when that resiliency is lost, the sealing effect will be impaired.

Considering the incompressible nature of the rubber in the sealing element disclosed in Chinnery et al., its stiffening and reinforcement by the cylindrical sheet metal member, and its "interference press fit" in the bore, it seems clear to us that the Chinnery et al. seal cannot function in the manner of appellant's seal. Now, as to the contention that Jepson would suggest inserting a set of spring fingers, the resilient element of Chinnery et al. is forced so tightly into the bore

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and is so "stiffened" that the use of the resilient spring fingers of Jepson could not possibly increase the resilient deformation of the Chinnery et al. seal in the direction of the bore or increase the sealing engagement of the seal with the bore. The teaching of the Chinnery et al. patent points away from the addition of any spring element. On the other hand, we find nothing in the disclosure of Jepson's coffee maker gasket to suggest that any part of it has applicability to shaft seals. The two arts are at least somewhat remote from each other even if they both involve sealing.

[2] We, therefore, find that Chinnery et al. did not teach the shaft sealing art how to solve the problems which existed in that art at the time of appellant's invention. We hold, further, that the combination of Jepson with Chinnery et al. is not a proper ground for rejection of the claims here on appeal. This suggested combination of references would require a substantial reconstruction and redesign of the elements shown in Chinnery et al. as well as a change in the basic principles under which the Chinnery et al. construction was designed to operate.

Once appellant had taught how this could be done, the redesign may, by hindsight, seem to be obvious to one having ordinary skills in the shaft sealing art. However, when viewed as of the time appellant's invention was made, and without the benefit of appellant's disclosure, we find nothing in the art of record

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which suggests appellant's novel oil seal as defined in claims 1, 4 and 7.

We shall now consider the rejection of claim 10, remarking first that it differs from claims 1, 4 and 7 in that it is directed to a combination of a housing bore, a resilient sealing ring and a metal retaining ring connected to the sealing ring, wherein the metal ring has *resilient hooks* which secure the seal in the bore. This claim is not limited to the outwardly biased spring fingers.

The examiner rejected claim 10 on two grounds: (1) that substitution for the screw securing means of Chinnery et al. of a series of spring hooks such as disclosed by Norton would not involve patentable invention, and (2) unpatentability over Roth.

[3] We shall first dispose of the second rejection. The board held that claim 10 is drawn to a combination of a sealing ring and a housing bore in which the sealing ring is detachably placed and that Roth discloses nothing of this nature. The board therefore *reversed* the rejection on Roth and consequently it is not before us.

As to the first rejection, the board recognized that it was on the ground of unpatentability "over Chinnery et al. in view of Norton" and pointed out that the examiner could see nothing patentable in substituting spring hook attaching means shown in Norton for the screws of Chinnery et al. It then said:

Appellant argues that the references fail to suggest or teach how the proposed [claimed] combination could be made and after a careful consideration of the references, *we have concluded that he is correct in this respect. We therefore concede that the claim * * * defines novelty over the disclosure of Fig. 8 of Chinnery et al.* Novelty alone however, is no proper basis for the allowance of a claim. (Emphasis ours.)

[4] Although, in reaching this conclusion, the board made no reference to Norton, the context compels the conclusion that novelty was found notwithstanding the disclosure of Norton, taken together with Chinnery et al. We fully agree, of course, with the board's statement that novelty alone is not enough for patentability.

With the next statement of the board, in explanation of its affirmance of the rejection of claim 10, we do not agree. It reads:

In order to *properly* define invention [meaning, of course, *patentable* invention], a claim should clearly define a structure *which possesses some definite advantage over the prior art*. As far as we can determine there is *no better* combination of housing and seal produced by using a series of snap fastener connections to connect the seal to the housing, as in appellant's structure, over using a series of bolts, as in the structure shown by Chinnery et al. Both act to merely detachably connect one element to another element and as far as we can find are merely equivalent connecting means especially in the absence of any unexpected result *or advantage* being obtained, by using one means in preference to the other, on which the record before us is entirely silent. (Emphasis ours.)

If we may extract from the foregoing what we understand to be the essence of the board's position in the matter, it is that claim 10 is not patentable, though it defines a combination which is novel over the disclosures of the references, because the claimed combination has not been shown to be any better than, or to possess any advantage over, what was known to the art.

[5] [6] As was pointed out in *In re Stempel, Jr.*, 44 CCPA 820, 241 F.2d 755, 113 USPQ 77, an applicant is entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applies. The statutory requirements

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for patentability, broadly stated, are novelty, usefulness and unobviousness, as provided in 35 U.S.C. sections 101, 102, and 103. While it is true that proof that an invention *is* better or *does* possess

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advantages may be persuasive of the existence of any one or all of the foregoing three requirements, and hence be indicative of patentability, Congress has not seen fit to make such proof a prerequisite to patentability.¹

¹ A critical essay on the existing law has recently appeared under the title "A Proposal for: A Standard of Patentability; Consonant Statutory Changes; A Manual on Determination of Patentability," by Malcolm F. Bailey, 41 J.P.O.S. 192-225, 231-257. It advocates, as we understand it, that the present law should be changed to set up as the test for patentability, in place of the requirement of section 103 that an invention be unobvious, a requirement that the invention involve *progress*, which the author finds in the constitutional provisions. Congress has not seen fit to include in the statutes, at any time during the past 169 years so far as we are aware, a requirement that each and every patentable *invention* shall involve "progress" in this sense, i.e., that each new invention must also be shown to possess some definite advantage over the prior art. The author relates the term "progress" to individual inventions and then gives it the connotation that each such invention should be a technical advance, improvement or betterment. The very making of the suggestion to change the law is an indication that the existing law is otherwise.

[7] Appellant's invention, as defined in claim 10, has been held by the board to possess novelty over the disclosure of Chinnery et al. Just what the board thought about the pertinency of Norton is obscure but it seems to have regarded this reference as of little moment. Appellant in his brief here said that Norton was held by the board to have no bearing on the invention and the Patent Office brief said that the appellant was correct in so stating and that the court need not consider it. We are, therefore, virtually without any reference against claim 10 except Chinnery et al. and the rejection thereon is predicated solely on a theory of patentability we find to be outside of the patent statutes, namely, that the combination of claim 10 is, by reason of the use of spring retaining hooks instead of a series of bolts, *no better* than the combination of Chinnery et al. However intriguing such a ground of rejection may be, it is the duty of the tribunals of the Patent Office and of this court to apply the law as Congress has written it. While the provisions of the former R.S. 4893 may be said to have given the Commissioner some discretion in refusing to grant a patent on an otherwise patentable invention unless "the same is sufficiently useful and important," when the Patent Codification Act of 1952 was enacted, Congress removed this provision from old section 36 of title 35, now section 131. We take this as a further indication that it is the intent of Congress that patentability be determined solely by the provisions of sections 101, 102 and 103. We therefore reverse the board on this ground of rejection of claim 10.

If the issue before us were whether or not the spring hooks *are* better than the Chinnery et al. bolts—and we consider this in the event we have misapprehended the position of the board—we would hold that they are, on the basis of what is disclosed in the application. This retaining means seems to possess many advantages over screws. Similarly, if the board was intending to say that the hooks and the bolts are merely equivalent connecting means and that claim 10 is unpatentable because its combination differs from the prior art only in the substitution of an equivalent for one element in an old combination, then we would also have to disagree since we think it is clear that the use of the spring hooks produces a result quite different from the bolts of Chinnery et al. On the record before us no reference relied on shows any spring hooks nor does it contain any support for the contention that bolts and spring hooks are equivalents.

For the foregoing reasons we reverse the rejection of claim 10.

The rejections of claims 1, 4, 7 and 10 are reversed.

Concurring Opinion Text

Concurrence By:

MARTIN, Judge, concurs in result.

Dissenting Opinion Text

Dissent By:

KIRKPATRICK, Judge, dissenting, in which WORLEY, Chief Judge, joins.

I think that the board's rejection of claims 1, 4 and 7 should be *affirmed*. The central idea and the most important feature of these three claims, as well as of allowed claim 5, is the exertion of outwardly directed pressure upon the bore engaging portion of the sealing member, the result accomplished being to counteract the tendency of rubber to "set" or lose its resiliency and so become ineffective to prevent leakage. Jepson comes very close to completely anticipating this feature of the patent. All that would be necessary to make the anticipation complete would be to provide the Jepson seal with a shaft engaging portion and, incidentally, claim 7 does not specify any shaft engaging portion.

Of course, it was necessary that the seal be attached to the bore in a manner to prevent its displacement. Chinnery provides a flange and screws for this purpose and none of the three claims referred to calls for anything more specific than "means." Thus it seems clear that

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claims 1, 4 and 7 show no patentable novelty as against the prior art of Chinnery plus Jepson.

The only question is whether Jepson is in a nonanalogous art sufficiently remote from that of the application to put it beyond the probability that it would be considered by persons skilled in the art endeavoring to solve the problem to the solution of which the application is directed. I do not think that it is. Jepson was trying to meet exactly the same problem as the application under consideration, namely, to provide a compressible seal which could be readily detached or inserted in a cylindrical bore but which would maintain a firm and leakproof seat on the bore when in place. I agree with the Solicitor's argument that one seeking to improve a machinery seal would reasonably be expected to investigate not only machinery seals but seals in other arts where similar problems would be encountered. See *In re O'Connor*, 34 CCPA 1055, 161 F.2d 221, 73 USPQ 433 .

Claim 10 stands on a somewhat different basis. This claim entirely omits what I think, and have stated above, to be the heart of the application. In substance, claim 10 really amounts to no more than a claim for a hook formation to interlock with the housing of a bore in order to hold a press fit seal in place.

¹Chinnery discloses means to serve the same purpose consisting of screws.

¹ Chinnery discloses a press fit seal, but no one has suggested that there is anything new about such a device and the specification of the application before us concedes that it is old in the art.

The board conceded that the combination disclosed in claim 10, consisting of spring hooks to fasten a press fit seal to the bore, disclosed novelty over Chinnery but not patentable novelty.

I do not read the opinion of the board as predicated its conclusion of want of invention on the theory that in order to be patentable a combination must have some distinct advantage over the prior art. The board stated that there was nothing in the record to show that the substitution of hooks for screws produced any unexpected result or advantage and, therefore, concluded that the introduction of hooks did not create patentable novelty, but was a mere substitution of equivalents. The statement that the spring hooks of Ratti were no better than the screws of Chinnery was directed toward this point and seemingly was added to fortify the board's finding of equivalency rather than to propound a theory of patentability. I agree with

the board that this claim, though it may show novelty over Chinnery, does not show patentable novelty, and I would affirm its rejection.

- End of Case -

Source: USPQ, 1st Series (1929 - 1986) > U.S. Court of Appeals, Federal Circuit > Hybritech Incorporated v. Monoclonal Antibodies, Inc., 231 USPQ 81 (Fed. Cir. 1986)

Hybritech Incorporated v. Monoclonal Antibodies, Inc., 231 USPQ 81 (Fed. Cir. 1986)

231 USPQ 81

Hybritech Incorporated v. Monoclonal Antibodies, Inc.

U.S. Court of Appeals Federal Circuit

No. 86-531

Decided September 19, 1986

802 F2d 1367

Headnotes

PATENTS

[1] Patentability -- In general (► 51.01)

Federal district court's finding that evidence was lacking as to when, before May 1980, claimed invention of using monoclonal antibodies in "sandwich" assays was conceived by patent holder, is clearly erroneous, in view of evidence demonstrating patent holder's earlier efforts in developing claimed invention by using prior art technology to produce necessary monoclonal antibodies in diagnostic sandwich assay kits, in view of evidence demonstrating that exploiting monoclonal antibodies for use in sandwich assays was one of patent holder's major objectives, and in view of laboratory notebooks and research program that fully corroborate testimonial evidence of conception, since such evidence clearly supports holding that patent holder conceived claimed invention before patent challenger and that patent challenger's work is not prior art.

[2] Patentability -- Anticipation -- In general (► 51.201)

Prior art work that involved "sandwich" assay to extent that antigen was sandwiched between two monoclonal antibodies, but that did not involve detecting presence of or quantitating antigen, did not anticipate claimed invention, since it did not meet its every element.

[3] Patentability -- Invention -- In general (► 51.501)

Articles which "predicted" widespread use of monoclonal antibodies but which are dated well after patented monoclonal assay's date of conception and within one year of its filing date, are not prior art, nor should earlier articles which discussed production of monoclonal antibodies, although clearly prior art, have been relied upon to establish obviousness of trying monoclonal antibodies of particular affinity in "sandwich" immunoassay that detects presence of or quantitates antigen, since such articles do not suggest how that end may be accomplished, and since "obvious to try" is improper consideration in adjudicating obviousness issue.

[4] Patentability -- Evidence of -- Commercial success -- Causes (► 51.4555)

Trial court's finding that "sudden availability" of monoclonals was reason for commercial success of patented diagnostic kits is clearly erroneous, in view of evidence demonstrating that at least three years passed between time monoclonal antibodies were available in adequate supply and time patent holder began selling its kits.

[5] Claims -- Indefinite -- Chemical (► 20.553)

Federal district court erred in holding that claims for monoclonal assay are indefinite because antibody affinity cannot be estimated with any consistency, since calculating affinity was known in art at time of filing, and since such claims reasonably apprise those skilled in art and are as precise as subject matter permits, even though calculations are not precise or "standard."

Particular Patents

Particular patents -- Assays

4,376,110, David and Green, Immunometric Assays Using Monoclonal Antibodies, holding of invalidity *reversed*.

Case History and Disposition

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Appeal from District Court for the Northern District of California, Conti, J.; 227 USPQ 215 .

Action by Hybritech Incorporated, against Monoclonal Antibodies, Inc., for patent infringement. From judgment for defendant, plaintiff appeals. Reversed and *remanded*.

Attorneys

Douglas E. Olson, and Lyon & Lyon, both of Los Angeles, Calif. (James W. Geriak and Bradford J. Duft, both of Los Angeles, Calif., on the brief) for appellant.

David J. Brezner, and Flehr, Hohback, Test, Albritton & Herbert, both of San Francisco, Calif. (Barry E. Britschneider and Herbert I. Cantor, both of Washington, D.C., of counsel) for appellee.

Judge

Before Rich, Davis, and Smith, Circuit Judges.

Opinion Text

Opinion By:

Rich, Circuit Judge.

This appeal is from the August 28, 1985, decision of the United States District Court for the Northern District of California, 623 F.Supp. 1344, 227 USPQ 215 , in favor of defendant Monoclonal Antibodies, Inc. (Monoclonal) holding that all 29 claims of plaintiff's patent No. 4,376,110 entitled "Immunometric Assays Using Monoclonal Antibodies" ('110 patent), issued to Dr. Gary S. David and Howard E. Greene and assigned to Hybritech Incorporated (Hybritech), are invalid as anticipated under 35 USC 102(g), for obvious

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ness under § 103, and under § 112 first and second paragraphs. We reverse and remand.

Background

Vertebrates defend themselves against invasion by microorganisms by producing antibodies, proteins which can complex with the invading microorganisms and target them for destruction or removal. In fact, any foreign molecule of sufficient size can act as a stimulus for antibody production. Such foreign molecules, or antigens, bear particular sites or epitopes that represent antibody recognition sites. B cell lymphocytes, the cells that actually produce antibodies, recognize and respond to an epitope on an antigen by reproducing or cloning themselves and then producing antibodies specific to that epitope. Even if the antigen is highly purified, the lymphocytes will produce antibodies specific to different epitopes on the antigen and so produce antibodies with different specificities. Furthermore, because the body is exposed to many different antigens, the blood of a vertebrate will contain antibodies to many different antigenic substances.

Scientists and clinicians have long employed the ability of antibodies to recognize and complex with antigens as a tool to identify or label particular cells or molecules and to separate them from a mixture. Their source of antibodies has been primarily the serum separated from the blood of a vertebrate immunized or exposed to the antigen. Serum, however, contains a mixture of antibodies directed to numerous antigens and to any number of epitopes on a particular antigen. Because such a mixture of antibodies arises from many different clones of lymphocytes, it is called "polyclonal."

Recent technological advances have made it possible to isolate and cultivate a single clone of lymphocytes to obtain a virtually unlimited supply of antibodies specific to one particular epitope. These antibodies, known as "monoclonal antibodies" because they arise from a single clone of lymphocytes, are produced by a relatively new technology known as the hybridoma. Hybridomas are produced by fusing a particular cancer cell, the myeloma cell, with spleen cells from a mouse that has been injected or immunized with the antigen. These fusions are isolated by transferring them to a growth fluid that kills off the unfused cancer cells, the unfused spleen cells dying off by themselves. The fused hybrid spleen and myeloma cells, called hybridomas, produce antibodies to the antigen initially injected into the mouse. The growth fluid containing the hybridomas is then diluted and put into individual test tubes or wells so that there is only one hybridoma per tube or well. Each hybridoma then reproduces itself and these identical hybridomas each produce identical monoclonal antibodies having the same affinity and specificity. In this way, a virtually unlimited supply of identical antibodies is created, directed to only one epitope on an antigen rather than, as with polyclonal antibodies, to many different epitopes on many different antigens.

In addition to the specificity of antibodies to particular epitopes discussed above, antibodies also have a characteristic "sensitivity," the ability to detect and react to antigens. Sensitivity is expressed in terms of "affinity:" the greater an antibody's ability to bind with a particular antigen, the greater the antibody's affinity. The strength of that antibody-antigen bond is in part dependent upon the antibody's "affinity constant," expressed in liters per mole, for the antigen.

Immunoassays, the subject matter of the '110 patent are diagnostic methods for determining the presence or amount of antigen in body fluids such as blood or urine by employing the ability of an antibody to recognize and bind to an antigen. Generally, the extent to which the antibody binds to the antigen to be quantitated is an indication of the amount of antigen present in the fluid. Labelling the antibody or, in some cases, the antigen, with either a radioactive substance, I 125, or an enzyme makes possible the detection of the antibody-antigen complex. In an extreme case, where the fluid sample contains a very low level of the antigen, binding might not occur unless the antibodies selected or "screened" for the procedure are highly sensitive.

In the case of a "competitive" immunoassay, a labelled antigen reagent is bound to a limited and known quantity of antibody reagent. After that reaction reaches equilibrium, the antigen to be detected is added to the mixture and competes with the labelled antigen for the limited number of antibody binding sites. The amount of labelled antigen reagent displaced, if any, in this second reaction indicates the quantity of the antigen to be detected present in the fluid sample. All of the antigen attached to the antibody will be labelled antigen if there is no antigen in the test fluid sample. The advantage of this method is that only a small amount of antibody is needed, its drawback, generally, that the system must reach equilibrium, and thus produces results slowly.

In the case of a "sandwich" assay, otherwise known as an immunometric assay, the latter being a term coined by Dr. Lawton Miles in 1971, a quantity of unlabelled antibody reagent is bound to a solid support surface such as the inside wall of a test tube containing a complex of the fluid sample containing the

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antigen to be detected and a labelled *antibody* reagent. The result is an insoluble three part complex referred to as a sandwich having antibody bread and antigen filling. This figure is illustrative of the sandwich concept:

Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA at 1-800-372-1033.

The advantage of the sandwich assay is that it is fast and simple, its drawback that enormous quantities of antibodies are needed.

Hybritech

Hybritech, started in 1978 and joined thereafter by coinventors Green and Dr. David, has, since 1979, been in the business of developing diagnostic kits employing monoclonal antibodies that detect numerous antigens and thus a broad range of conditions such as pregnancy, cancer, growth hormone deficiency, or hepatitis. Examples of antigens include influenza viruses, immunoglobulin E (IgE) which indicates allergic reaction, human chorionic gonadotropin (HCG) which indicates pregnancy, and prostatic acid phosphatase (PAP) which indicates prostate cancer, to name a few. Dr. Adams, a business-experienced scientist, joined the company in May 1980 as head of research and development. The '110 patent, application for which was filed August 4, 1980, issued March 8, 1983, with claims defining a variety of sandwich assays using monoclonal antibodies. Claim 19, apparently the broadest of the twenty-nine in the patent, is directed generally to a sandwich assay and reads (emphasis ours):

19. In an *immunometric* assay to determine the presence or concentration of an antigenic substance in a sample of a fluid comprising forming a ternary complex of a first labelled antibody, said antigenic substance, and a second antibody said second antibody being bound to a solid carrier insoluble in said fluid wherein the presence of the antigenic substance in the samples is determined by measuring either the amount of labelled antibody bound to the solid carrier or the amount of unreacted labelled antibody, *the improvement comprising* employing monoclonal antibodies having an affinity for the antigenic substance of at least about 10⁸ liters/mole for each of said labelled antibody and said antibody bound to a solid carrier.

Claim 1, directed particularly to a reverse sandwich assay, explained *infra*, reads:

1. A process for the determination of the presence of [sic, or] concentration of an antigenic substance in a fluid comprising the steps:

(a) contacting a sample of the fluid with a measured amount of a soluble first monoclonal antibody to the antigenic substance in order to form a soluble complex of the antibody and antigenic substance present in said sample, said first monoclonal antibody being labelled;

(b) contacting the soluble complex with a second monoclonal antibody to the antigenic substance, said second monoclonal antibody being bound to a solid carrier, said solid carrier being insoluble in said fluid, in order to form an insoluble complex of said first monoclonal antibody, said antigenic substance and said second monoclonal antibody bound to said solid carrier;

(c) separating said solid carrier from the fluid sample and unreacted labelled antibody;

(d) measuring either the amount of labelled antibody; associated with the solid carrier or the amount

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of unreacted labelled antibody; and

(e) relating the amount of labelled antibody measured with the amount of labelled antibody measured for a control sample prepared in accordance with steps (a)-(d), said control sample being known to be free of said anti-genic substance, to determine the presence of antigenic substance in said fluid sample, or relating the amount of labelled antibody measured with the amount of labelled antibody measured for samples containing known amounts of antigenic substance prepared in accordance with steps (a)-(d) to determine the concentration of antigenic substance in said fluid sample, the first and second monoclonal antibodies having an affinity for the antigenic substance of at least about 10⁸liters/mole.

The District Court Decision

Hybritech sued Monoclonal March 2, 1984, for damages and an injunction alleging that the manufacture and sale of Monoclonal's diagnostic kits infringed the '110 patent. Trial without a jury began on August 5, 1985, and concluded August 23, 1985, thirty witnesses having been heard and over 2,000 pages of transcript generated. The district court produced the reported opinion, findings, and con

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clusions, which use nearly verbatim Monoclonal's *pre-trial* brief and *pre-trial proposed* findings of fact and conclusions of law, in three days, in support of the judgment now on appeal.

The district court held that the claimed subject matter of the '110 patent was neither conceived nor actually reduced to practice before May 1980, and was anticipated under § 102(g) by the actual reduction to practice of the invention by Drs. Uotila and Ruoslahti at the La Jolla Cancer Research Foundation (LJCRF) as early as November of 1979 and by the actual reduction to practice of the invention by Drs. Oi and Herzenberg (Oi/Herzenberg work) at the Stanford University Laboratory as early as July 1978, later published in December of 1979.

The district court also held the claims of the '110 patent invalid for obviousness from the Oi/Herzenberg work in view of (1) a February 1979 article by M. E. Frankel and W. Gerhard (Frankel article) which discloses high-affinity monoclonal antibodies, and apparently in view of numerous other references including (2) the work of Nobel Prize winners G. Kohler and C. Milstein disclosing a Nobel Prize-worthy method for producing monoclonal antibodies in vitro (outside the body) published in an August 7, 1975, article; (3) U.S. Patent No. 4,244,940 issued to Jeong et al. disclosing a simultaneous polyclonal assay (Jeong), U.S. Patent No. 4,098,876 to Piasio et al. disclosing a reverse polyclonal sandwich assay (Piasio), U.S. Patent No. 4,016,143 to Schurrs et al. disclosing a forward polyclonal sandwich assay (Schurrs); (4) a July 1979 publication by A. C. Cuello et al. disclosing the use of monoclonal antibodies in competitive assays; and (5) eight articles dated between January 1979 and March 6, 1980, "predicting" that monoclonal antibodies would be used in future immunoassays.¹

¹ With respect to obviousness, one portion of the district court's opinion apparently relies on all of the above listed references, (1)-(5), for the obviousness holding while a later portion entitled "CONCLUSIONS OF LAW" relies on only the Oi/Herzenberg and Frankel articles. Furthermore, the district court did not state that the LJCRF work was considered for purposes of § 103, although we recognize that § 102(g) prior art can be used for § 103.

The district court also invalidated the patent on various grounds based on 35 USC 112, first and second paragraphs, as hereinafter discussed.

A. The References

1. Kohler and Milstein's Nobel Prize-Winning Work: Producing Monoclonal Antibodies In Vitro For the First Time

In early immunoassay work, polyclonal antibodies produced in vivo (in the body) in mice were used to bind with the antigen to be detected in the body fluid sample. Mice were immunized by injection with antigen so that the lymphocytes in their bodies produced antibodies that attacked the injected antigen. Those polyclonal antibodies were *withdrawn* from the animal's blood and used in immunoassays. The major problem was that when the mice's immune systems changed or the mice died, the antibodies changed or died too; supply was limited and uncertain.

As the examiner was aware, Kohler and Milstein developed a technique not only for producing antibodies in vitro, independent of a living body, thus eliminating dependence on a particular animal, but for in vitro production of monoclonal antibodies by hybridomas, discussed in the Background section, supra.

Given that sandwich assays require enormous amounts of antibodies, companies like appellant and appellee, which utilize monoclonal antibodies for sandwich assays, would not be in business were it not for the work of Kohler and Milstein.

2. The Work of Drs. Ruoslahti, Uotila, and Engvall at the La Jolla Cancer Research Foundation (LJCRF) in 1979 and 1980

Dr. Ruoslahti performed mostly competitive immunoassays using polyclonal antibodies to alphafetoprotein (AFP) antigens at the City of Hope since 1970. Dr. Uotila joined him in late 1978 to perform immunoassays using monoclonal antibodies to AFP. After producing monoclonal antibodies to AFP and performing competitive radio immunoassays (RIA -- a competitive assay that uses a radioactive label) with monoclonal antibodies at the City of Hope in mid-1979, Drs. Ruoslahti, Uotila and Engvall left LJCRF.

In the fall of 1979, September or October according to Dr. Uotila, discussion and work began on using monoclonal antibodies to AFP in a sandwich assay. Dr. Uotila, the principal researcher in this particular endeavor, generated six notebooks while at the City of Hope and LJCRF. The next-to-last page of notebook four contained a note to Dr. Uotila from Dr. Ruoslahti reading:

Sometime you should enzyme label a good monoclonal antibody so that you can set up a sandwich assay. If you use two monoclonal antibodies, you may be able to do the assay with a single incubation, since the monoclonal antibodies are likely to be

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directed against different determinants and not compete with one another.

Although Dr. Uotila's notebook pages were, for the most part, unsigned, undated, and uncorroborated, Dr. Ruoslahti's testimony, placed the date of this note at about October 1979 by referring to the first pages of notebook five which were dated in early November 1979. Dr. Ruoslahti testified that one curve on one graph on page 43D of notebook five showed a successful simultaneous sandwich assay using monoclonal antibodies about November 5, 1979, although no data supporting that graph could be found elsewhere in the notebook. He further testified that the affinity of the monoclonal antibodies used for that test was not calculated until 1980 but that the raw data necessary for that calculation was generated in 1979.

Dr. Uotila stated in her deposition (she did not testify at trial) that she started work on a sandwich assay using monoclonal antibodies between October 4 and the end of that month, 1979, and that she could not remember the procedure used nor was there enough information in her notebook, including page 43D, to refresh her memory. She did remember, although she continued work on this assay because the tests did not yield repeatedly good curves without which she would not publish her work, that the assay on page

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43D was successful. Dr. Engvall testified about a discussion of Dr. Uotila's monoclonal antibody work with her while at the City of Hope and about first performing a sandwich assay after arriving at LJCRF in 1979.

3. The Work of Drs. Oi and Herzenberg at the Stanford University Laboratory in 1978 Published in December 1979

Drs. Oi and Herzenberg used monoclonal antibodies to "map" epitopes or determine the number and location of different antibody binding sites on a known quantity of IgE antigen by attaching to it an antibody bound to a carrier and exposing that antigen to other monoclonal antibodies. The antibodies either attached to epitopes on the antigen or were blocked from doing so by the other monoclonal antibodies, depending on the location and number of epitopes; if the epitopes on the antigen were too close together and the number of antibodies too great, few antibodies would bind to the antigen. Hybritech points out that both Dr. Herzenberg and Dr. Oi testified that *their work did not involve determining the presence or quantity of antigen*, that they had no idea what the affinities of the monoclonal antibodies used were, and that those values were never calculated.

One unsigned, unwitnessed page from three large laboratory notebooks, which Hybritech argues is insufficient because it does not identify the chemical reagents or protocol used, was relied on by Monoclonal to establish actual reduction to practice of the Oi/Herzenberg work in 1978 to establish a case of § 102(g) prior invention by another. The district court agreed with Monoclonal that the Oi/Herzenberg work anticipated the claimed invention and, in addition, combined this work with the Frankel publication to hold that the claimed subject matter was obvious under § 103.

4. The Frankel Article: Monoclonal Antibodies Having Affinities of 10⁹liters/mole

Frankel describes an RIA (radioimmunoassay) method for the rapid determination of affinity constants for monoclonal antibodies produced from hybridomas. The article states that the assay used is applicable only to antibodies with binding constants of about 10¹⁰liters/mole and discloses the binding constants for antibodies to several closely related strains of influenza virus.

The district court found that Frankel disclosed monoclonal antibodies having the affinity constants claimed in the '110 patent, 10⁸ to over 10⁹liters/mole.

5. The Cuello Article and the Jeong, Piasio, and Schurr Patents Considered by the Examiner

Cuello, dated July 1979, states that it describes the usefulness of monoclonal antibodies in the characterization and localization of neurotransmitters such as Substance P, a peptide clearly associated with the transmission of primary sensory information in the spinal cord. The article discloses producing monoclonal antibodies from hybrid myelomas (hybridomas), their use in conventional radioimmunoassay techniques, and the benefits from doing so which flow from the ability to derive permanent cell lines capable of continuous production of highly specific antibodies.

The district court found that the examiner twice rejected all of the claims of the '110 patent based on Cuello alone or in combination with the Jeong, Piasio, and Schurr references which disclose various sandwich assays using polyclonal antibodies. The court also found that the examiner allowed the claims after they were amended to include the 10⁸affinity limitation and after Richard Bartholomew, a Hybritech employee, submitted an affidavit alleging the advantages of using monoclonal rather than polyclonal antibodies in sandwich assays.

Apparently based on the testimony of Monoclonal's expert witness Judith Blakemore, a named inventor of the Jeong patent, manager of antibody programs at Bio-Rad Laboratories from 1975 to 1982, and currently manager of monoclonal antibody therapeutics at Cetus Corporation, a Hybritech competitor in immunoassay diagnostics, the district court stated

that the "reasons for allowance were not well-founded because (1) the alleged advantages were expected as naturally flowing from the well-known natural characteristics of monoclonal antibodies . . . ; (2) . . . were not significant . . . ; or (3) were at best minor," although they were "*argued* to the examiner as if they were" important. These were Monoclonal's words from its pretrial submission adopted by the court.

6. *The References That "Predicted" the Use of Monoclonal Antibodies in Immunoassays*

The district court stated, again in Monoclonal's words, that "it is of the utmost importance" that the advantages of monoclonal antibodies were "predicted by a number of authorities," eight to be exact, not important enough to list here, after the Kohler and Milstein discovery and after monoclonal antibodies became available.

B. The Claimed Subject Matter of the '110 Patent

Hybritech argues that the district court's determination that there is no credible evidence of conception or reduction to practice of the '110 invention before May 1980 is error because Dr. David's laboratory notebooks, Nos. 21 and 24, clearly show successful sandwich assays using monoclonal antibodies in August, September, and October of 1979. At the least, argues Hybritech, the invention was conceived in January of 1979, long before Drs. Ruoslahti, Engvall, and Uotila began work on a sandwich assay using monoclonal antibodies, and diligence was thereafter exercised until constructive reduction to practice occurred by the filing of the '110 patent application on August 4, 1980.

Dr. David and Greene testified that pages 2118 to 2122 of Dr. David's notebook, dated January 4, 1979, and witnessed January 30, 1979, disclose the generic conception of the invention in the context of the physical support structure used to carry out a sandwich assay, and Dr. David testified on redirect that (1) Page 1128 of notebook 21, dated May 27, 1979, recorded an early attempt at a sandwich assay that failed, (2) on August 3, 1979, as recorded at page 1166, a sandwich assay using monoclonal antibody 068 attached to a solid carrier, a radio-labelled 068 antibody, and a hepatitis antigen from an Abbott Labs polyclonal competitive assay kit was successfully performed, and (3) a sandwich assay using a bound 259 antibody, a radio-labelled 068 antibody, and a hepatitis antigen was successfully performed on September 21, 1979. Hybritech also urges that work in October 1979 directed to determining whether certain monoclonal antibodies were recognizing the same or different determinants, was a reduction to practice.

Monoclonal points out that these notebook pages do not expressly state that monoclonal antibodies of 10⁸ liters/mole affinity were used in a sandwich assay and that the May, August, and September notebook entries were not witnessed until about the time Dr. Adams, experienced in patent matters, joined Hybritech and advised its researchers on properly recording laboratory work. They therefore claim that actual reduction to practice was not shown before May 1980.

OPINION

I. Review Under Rule 52(a) Fed.R. Civ. P.

Rule 52(a) "ensures care in the preparation of an opinion . . . and provides appellate courts with the benefit of the District Court's insights into a case," *Pentec, Inc. v. Graphic Controls Corp.*, 776 F.2d 309 318, 227 USPQ 766, 772 (Fed.Cir. 1985) (Harvey, Senior District Judge, concurring) by requiring a district court to "find the facts specially and state separately its conclusions of law thereon." With the exception of the first eight paragraphs, the first half of the district court's opinion here is Monoclonal's *pretrial* brief and the last three pages of the opinion are Monoclonal's *pretrial* findings of fact and conclusions of law. The district court adopted the above documents virtually verbatim, with the exception of portions of each concerning inequitable conduct and noninfringement, apparently without inviting a response from Hybritech, resulting in a repetitious (as the district court admitted in the opinion), sometimes internally inconsistent, and hard to follow opinion that presents us with a difficult task in gleaning the basis for many of the conclusions. For some of the findings, submitted before trial, no supporting evidence was

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introduced at trial.

The Supreme Court, in *Anderson v. City of Bessemer City, N.C.*, 105 S.Ct. 1504 (1985), strongly criticized the practice of “verbatim adoption of findings of fact prepared by prevailing parties, particularly when those findings have taken the form of conclusory statements unsupported by citation to the record.” *Anderson*, supra at 1511. This court also has cautioned against the adoption of findings, especially when proposed by a party before trial, as here, and stated that the likelihood of clear error in those findings increases in such a situation. *Lindemann Maschinenfabrik v. American Hoist and Derrick*, 730 F.2d 1452, 1457, 221 USPQ 481, 485 (Fed.Cir. 1984).

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Notwithstanding our misgivings about whether the findings in this case, prepared before any evidence was introduced, satisfy the objectives of Rule 52(a) -- a carefully prepared opinion providing the reviewing court with the benefit of the district court's *reasoned insights* into the case -- those findings are the district court's and may be *reversed* only if clearly erroneous. See *Anderson*, supra, at 1511; *Lindemann*, 730 F.2d at 1457, 221 USPQ at 485.

“A finding is clearly erroneous when, although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.” *United States v. United States Gypsum Co.*, 333 U.S. 364, 395 (1948). “This standard plainly does not entitle a reviewing court to reverse the finding of the trier of fact simply because it is convinced that it would have decided the case differently.” *Anderson*, supra, at 1511. In other words, “if the district court's account of the evidence is plausible in light of the record viewed in its entirety” or “where there are two permissible views of the evidence,” the factfinder cannot be clearly erroneous. *Anderson*, supra, at 1511 (quoting *United States v. Yellow Cab Co.*, 338 U.S. 338, 342 (1949)). This is so, stated the Court in dictum, see *Anderson*, supra, at 1516 (Blackmun, J., concurring), even when the district court's findings rest on physical or documentary evidence or inferences from other facts and not on credibility determinations. See also Rule 52(a) Fed.R.Civ.P. (as amended Aug. 1, 1985). If the latter are involved, “Rule 52 demands even greater deference to the trial court's findings” but a trial judge may not “insulate his findings from review by denominating them credibility determinations”; if documents or objective evidence contradict the witness' story, clear error may be found even in a finding purportedly based on a credibility determination. *Anderson*, supra, at 1512-13. We proceed in light of all these principles.

II. Presumption of Validity

Under 35 USC 282, a patent is presumed valid, and the one attacking validity has the burden of proving invalidity by clear and convincing evidence. See, e.g., *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1360, 220 USPQ 763, 770 (Fed.Cir. 1984). Notwithstanding that the introduction of prior art not before the examiner may facilitate the challenger's meeting the burden of proof on invalidity, the presumption remains intact and on the challenger throughout the litigation, and the clear and convincing standard does not change. See, e.g., *Jervis B. Webb Co. v. Southern Systems, Inc.*, 742 F.2d 1388, 1392 & n.4, 222 USPQ 943, 945 & n.4 (Fed.Cir. 1984). The only indication that the district court recognized the presumption of validity and its proper application was its statement that “[t]he key issue in this case is whether the defendant has overcome the presumption of nonobviousness.” That statement, however, speaks only part of the truth; the presumption of validity goes to validity of the patent in relation to the patent statute as a *whole*, not just to nonobviousness under Section 103.

III. Prior Invention of Another, 35 USC 102(g)

Section 102(g) states that a person shall be entitled to a patent unless “before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it.” Section 102(g) “relates to prior inventorship by another in this country” and “retains the rules governing the determination of priority of invention” *Kimberly-Clark Corp. v. Johnson & Johnson*, 745 F.2d 1437, 1444, 223 USPQ 603, 606 (Fed.Cir. 1984) (quoting P.J. Federico, *Commentary on the New Patent Act*, 35 USCA page 1, at 19 (1954)). Section 102(g) says: “In determining priority of

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invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other."

Reduction to practice, and conception as well, is a legal determination subject to review free of the clearly erroneous standard. *Barmag Barmer Maschinenfabrik AG v. Murata Machinery, Ltd*, 731 F.2d 831, 837, 221 USPQ 561, 565-66 (Fed.Cir. 1984); *D.L. Auld Co. v. Chroma Graphics Corp.*, 714 F.2d 1144, 1151, 219 USPQ 13, 18 (Fed.Cir. 1983). Findings of fact supporting that legal conclusion, are, of course, reviewed under the clearly erroneous standard.

Conception is the "formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice." 1 *Robinson On Patents* 532 (1890); *Coleman v. Dines*, 754 F.2d 353, 359, 224 USPQ 857, 862 (Fed.Cir. 1985). Actual reduction to practice requires that the claimed invention work for its intended purpose, *see, e.g., Great Northern Corp. v. Davis Core & Pad Co.*, 782 F.2d 159, 165, 228 USPQ 356, 358, (Fed.Cir. 1986), and, as has long been the law, constructive reduction to practice occurs when a patent application on the claimed invention is filed. *Weil v. Fritz*, 572 F.2d 856, 865 n.16,

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196 USPQ 600 , 608 n.16 (CCPA 1978) (citing with approval *Automatic Weighing Machine Co. v. Pneumatic Scale Corp.*, 166 F. 288 (1st Cir. 1909)).

[1] After a review of the record in its entirety, including the numerous corroborating Hybritech laboratory notebooks, internal documents, and pertinent testimony, we hold clearly erroneous the district court's finding that there is no clear or corroborated evidence "with regard to when before May 1980, the idea of actually using monoclonals in sandwich assays" was conceived or, more properly, of when the *claimed invention* was conceived, and therefore reverse the court's holding, as a matter of law, that Hybritech's inventors did not conceive the claimed invention before May 1980.

Hybritech's claim of conception, generally, is evidenced by the sometimes sparsely documented work of a start-up company whose first small advances evolved into the myriad activities of a mature company with efforts directed toward developing the claimed invention by first employing the Kohler and Milstein technology to produce the necessary monoclonal antibodies and using those antibodies in diagnostic sandwich assay kits. There is no doubt that exploiting monoclonal antibodies for use in sandwich assays was one of the major objectives of Hybritech. In a letter to Pharmacia Fine Chemicals dated April 26, 1979, Greene, in responding to Pharmacia's interest in Hybritech's products, outlined the latter's "efforts to bring the exciting new hybridoma technology into routine medical use" and its exploration of "several intriguing concepts for which monoclonals may open up new immunodiagnostic techniques heretofore infeasible with animal serums." Although company minutes in early 1979 contain little about the claimed subject matter and some of the discussions thereon, such as Greene's and Dr. Adams' conversation about monoclonal sandwich assays when the former was trying to woo Dr. Adams to join Hybritech were unrecorded, the Hybritech laboratory notebooks and the nature of Hybritech's research program fully corroborate the testimonial evidence of conception and thus clearly support our holding that Hybritech conceived the claimed invention before LJCRF.

Dr. David's January 1979 notebook describes, in detail, as explained by Greene and Dr. David at trial, a nylon apparatus that undoubtedly could be used for performing a sandwich assay using monoclonal antibodies, although Dr. David testified on cross-examination that at that time Hybritech had not yet developed any monoclonal antibodies, including attaching one of the reagents to a solid carrier ring, contacting that ring with a fluid sample in a microtiter plate well, adding a labelled reagent to the well after rinsing, and then "counting" or measuring the amount of either the labelled or unlabelled reagent after a prescribed time and second rinsing. The notebook then describes the procedure for detecting an antibody "(a-x)" to an antigen "(x)" complete with diagrams and text, both illuminated by Dr. David at trial. The notebook further states, "Alternatively, if one wished to quantitate an antigen, y, the identical procedure would be followed, except that reagents would be *reversed*, i.e. the reaction would be:" and there follows

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a clear illustration of an antibody attached to a solid carrier reacting with an antigen to form a complex, and that complex reacting with a second labelled antibody. The notebook was signed by Dr. David on January 4, 1979, and witnessed and signed on January 30 of the same year by Dr. Curry, the first cell biologist hired at Hybritech to set up the hybridoma production program.

Dr. David testified on direct that monoclonal antibodies were developed in the following months: antigens were purchased from outside sources and purified before being injected into mice; the spleen cells from those mice were fused with myelomas; and the resultant hybridomas were separated into well plates for development, and a radioimmunoassay procedure was carried out to determine the affinity of the antibodies.

The May 1979 failed sandwich assay, witnessed in May 1980, corroborates Dr. David's testimony that a polyclonal antibody bound to a solid carrier and a labelled monoclonal antibody were used in a sandwich assay with an antigen from Abbott Labs' Ausria polyclonal diagnostic kit for hepatitis. No binding was detected.

Dr. David testified about the experiment documented in the August 1979 notebook, a sandwich assay with a hepatitis antigen from an Abbott Labs Ausria kit with two Hybritech 068 monoclonal antibodies, one attached to a solid carrier bead and the other labelled; the purpose of the experiment was to quantitate the antigen. The notebook corroborates Dr. David's testimony that the test was positive and lists the counts per minute of the labelled antibody. Defendant Monoclonal's expert Ciotti testified about this experiment:

Also, of course, it is limited to -- it is limited to hepatitis antigen. And without a generic conception, it would just be merely a -- if it did work for its intended purpose -- which I would assume for purposes of discussion -- it *would be a reduction to practice of one embodiment*. And without a corresponding generic conception, I don't think it would be held to be the making of the invention in

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terms of, for instance, in claim 19. [Emphasis ours.]

Dr. David further testified that the September 21, 1979, record in David's notebook, witnessed months later, shows a reverse sandwich assay using a bound 259 monoclonal antibody and a labelled 068 monoclonal antibody with a hepatitis antigen with results confirmed by a dose response curve.² Hybritech further alleges that a laboratory notebook page dated October 1979 is a reduction to practice of the claimed invention but fails to cite any related testimony or other evidence in support thereof.

² A dose response curve is antigen concentration plotted against the signal produced by labelled antibody in an immunoassay. The signal increases with increasing antigen concentration in a successful assay but at some point decreases when the antigen concentration becomes too high.

Finally, the record shows that the claimed affinity limitation "of at least about 10⁸ liters/mole" was determined and appreciated during the course of the development of the claimed subject matter. Dr. David and Dr. Adams separately testified that the screening procedures used by Hybritech ensured that only monoclonal antibodies having at least 10⁸ liters/mole affinity would be used in assays. An October 1979 internal memorandum from Greene to the staff states "To improve comparisons we will express all affinities to the base ten to the eighth which represents the lower end of the useable range."

We are left with the definite and firm conviction that a mistake has been committed because the district court's account of the evidence that "there was no credible evidence of conception before May 1980" is insupportable. There is such evidence. The laboratory notebooks, alone, are enough to show clear error

in the findings that underlie the holding that the invention was not conceived before May 1980. That some of the notebooks were not witnessed until a few months to one year after their writing does not make them incredible or necessarily of little corroborative value. Admittedly, Hybritech was a young, growing company in 1979 that failed to have witnesses sign the inventors' notebooks contemporaneously with their writing. Under a reasoned analysis and evaluation of all pertinent evidence, however, we cannot ignore that Hybritech, within a reasonable time thereafter, prudently had researchers other than those who performed the particular experiments witness the notebooks in response to Tom Adams' advice. The notebooks clearly show facts underlying and contemporaneous with conception of the claimed invention and in conjunction with the testimony of Dr. David and Greene, and others, are altogether legally adequate documentary evidence, under the law pertaining to conception, of the formation in the minds of the inventors of a definite and permanent idea of the complete and operative invention as it was thereafter applied in practice. We thus are not moved by Monoclonal's argument that the findings of fact underlying conception are based on credibility determinations and are more sacrosanct than usual. See *Anderson, supra*, at 1512-13.

1. LJCRF Is Not Prior Art

Hybritech laboratory notebooks and the uncontradicted testimony of Dr. David and Mr. Greene show that development of the claimed invention proceeded diligently through the rest of 1979 and 1980, there being absolutely no evidence of record nor even argument by Monoclonal that Hybritech was not diligent in its efforts to reduce to practice the claimed invention during the period January 1979 to the '110 application filing date of August 4, 1980. We therefore hold as a matter of law that Hybritech's conception, which was before LJCRF conceived the claimed invention, coupled by diligence to its constructive reduction to practice by the filing of the '110 application, entitle Hybritech to priority over LJCRF. See 35 USC 102(g). The work of LJCRF is therefore not prior art.

We also note that there is inadequate factual basis for the district court's holding that LJCRF reduced the claimed invention to practice as early as November 1979 because the only evidence that corroborates the testimony of Ruoslahti, Uotila, and Engvall is the note from Ruoslahti to Uotila, see section A, 2, *supra*, which indisputably is not the claimed invention, and the *one* curve from *one* graph from only one page, 43D, of the six Uotila notebooks. After a reasoned examination, analysis, and evaluation of this pertinent evidence we conclude that it falls far short of showing the "formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice," see *Coleman*, 754 F.2d at 359, 224 USPQ at 862, and therefore is legally inadequate to support even a holding of *conception* of the claimed invention by LJCRF personnel in 1979.

(1) It is undisputed that page 43D was not signed, witnessed, or dated; (2) the deposition testimony of Uotila was that she could not remember the procedure used to arrive at the dose-response curve on page 43D and there was not enough information in her notebook to refresh her memory; (3) the testimony of

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Ruoslahti was that he could find *no* data in the notebook supporting that graph, none of the *later* graphs shown there represented successful assays and that "especially after this was done, we ran into more severe problems. And it took us a while to do away with the problems;" (4) Ruoslahti also testified that they never determined, in 1979, the affinities of the monoclonal antibodies they used, and that the title of page 43D had been altered at some point -- the word "inhibition" had been crossed out and "sandwich" written in; and (5) the testimony of Engvall was that there was nothing about the shape of those curves which indicates that they were sandwich assays. We also note, as evidence bearing upon the credibility of Ruoslahti's testimony (that LJCRF actually reduced the claimed invention to practice in 1979), that when LJCRF attempted to provoke an interference in the PTO with Hybritech based on the U.S. filing of an application that was the counterpart to a Swedish application disclosing similar subject matter, LJCRF could not demonstrate even a *prima facie* reduction to practice prior to Hybritech's August 4, 1980, filing date. During that proceeding, the earliest dates Ruoslahti set down on paper to support conception and reduction to practice were in 1980.

2. The Work of Oi/Herzenberg Is Not the Claimed Invention

[2] It is axiomatic that for prior art to anticipate under § 102 it has to meet every element of the claimed invention, and that such a determination is one of fact. See, e.g., *Lindemann*, supra, 730 F.2d at 1458, 221 USPQ at 485; *Great Northern Corp. v. Davis Core & Pad Co.*, 782 F.2d 159, 165, 228 USPQ 356, 358 (Fed.Cir. 1986). Section 102(g) upon which the district court relied is one type of "anticipation," i.e., prior invention by another of the same invention. Drs. Oi and Herzenberg testified that their work did not involve detecting the presence of or quantitating antigen but a determination of the number and location of epitopes on a *known* quantity of antigen. Although this work did involve a sandwich assay to the extent that an antigen was sandwiched between two monoclonal antibodies, it is clear that the similarity between that work and the claimed invention goes no further. Furthermore, both doctors testified that they did not know the affinities of the antibodies that were used in their mapping work and in fact never calculated them. Ciotti, Monoclonal's expert, testified that the 10⁸ affinity limitation cannot be found anywhere in the Oi/Herzenberg work. Again we are left with a definite and firm conviction that a mistake was made because that work does not meet every element of the claimed invention. The district court's finding to the contrary is clearly erroneous.

We note that the district court, in also holding the patent invalid under § 103, next considered, combined the Oi/Herzenberg work with the Frankel reference, one justifiable inference therefrom being that the court recognized that Frankel discloses a claim *element* that Oi/Herzenberg does not, namely, at least about 10⁸ liters/mole affinity.

IV. Obviousness, 35 USC 103

A section 103 obviousness determination -- whether the claimed invention *would have been* (not "would be" as the court repeatedly stated because Monoclonal's pretrial papers used that improper language) obvious at the time the invention was made is reviewed free of the clearly erroneous standard although the underlying factual inquiries -- scope and content of the prior art, level of ordinary skill in the art,³ and differences between the prior art and the claimed invention -- integral parts of the subjective determination involved in § 103, are reviewed under that standard. Objective evidence such as commercial success, failure of others, long-felt need, and unexpected results must be considered *before* a conclusion on obviousness is reached and is not merely "icing on the cake," as the district court stated at trial. See *Lindemann*, supra, 730 F.2d at 1461, 221 USPQ at 488; *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir. 1983); *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 219 USPQ 857 (Fed.Cir. 1983); *W.L. Gore & Associates v. Garlock Inc.*, 721 F.2d 1540, 220 USPQ 303, 314 (Fed.Cir. 1983).

³ Although the district court failed expressly to find the level of ordinary skill in the art at the time the invention was made, it did make reference to "[p]eople working in immunology aware of the Kohler and Milstein discovery" which we deem an accurate finding for the purposes of that portion of the *Graham* factual inquiries.

1. The Eight Articles "Predicting" Widespread Use of Monoclonal Antibodies

Before discussing the more pertinent references in this case -- the Oi/Herzenberg and Frankel works -- we cull the other prior art references relied on by the trial court.

[3] First, the latest four of the eight articles that the court stated were of the "utmost importance" because they "predicted" that the breakthrough in production of monoclonal antibodies by Kohler and Milstein would lead to widespread use of monoclonal antibodies in

immunoassays are neither 102(a)/103 nor 102(b)/103 prior art because they are dated between late 1979 and March 6, 1980, well after the date of conception and within one year of the filing date of the '110 patent.

The earliest four of the eight articles, on the other hand, although clearly prior art, discuss *production* of monoclonal antibodies -- admittedly old after Kohler and Milstein showed how to produce them -- but none discloses sandwich assays. At *most*, these articles are invitations to try monoclonal antibodies in immunoassays but do not suggest how that end might be accomplished. To the extent the district court relied upon these references to establish that it would have been *obvious to try* monoclonal antibodies of 10⁸liters/mole affinity in a sandwich immunoassay that detects the presence of or quantitates antigen, the court was in error. *See Jones v. Hardy*, 727 F.2d 1524, 1530, 220 USPQ 1021, 1026 (Fed.Cir. 1984) ("Obvious to try" is improper consideration in adjudicating obviousness issue).⁴

⁴ Finding 10, which states that the invention was contemporaneously developed and disclosed in at least five publications and patent applications not listed above *and dated well after the filing date of the '110 patent but before its issuance* is irrelevant for purposes of the hypothesis based on the three factual inquiries required by § 103 as interpreted by *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966) because obviousness must be determined as of the time the invention was made. Additionally, they are of little probative value in this case because they are dated December 1981 at the earliest, more than a year after the August 4, 1980, filing date here and roughly two years after conception occurred. Furthermore, simultaneous development may or may not be indicative of obviousness, the latter being the case here for the above reasons and because the other evidence of nonobviousness is adequate, such occurrences having been provided for in 35 USC 135. *Lindemann*, supra, 730 F.2d at 1460-61, 221 USPQ at 487; *Environmental Designs, Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 698 n.7, 218 USPQ 865, 869 n.7 (Fed.Cir. 1983)

2. The Kohler and Milstein Work, the Cuello Article and the Jeong, Piasio, and Schurr Patents Considered by the Examiner

The district court's finding that Kohler and Milstein developed a method for producing monoclonal antibodies *in vitro* is correct, but that finding proves no more; although it made possible all later work in that it paved the way for a supply of monoclonal antibodies, it indisputably does not suggest using monoclonal antibodies in a sandwich assay in accordance with the invention claimed in the '110 patent.

The Cuello reference discloses monoclonal antibodies but not in a sandwich assay. The competitive assay in Cuello, moreover, uses only one monoclonal antibody and thus in no way suggests the claimed invention wherein a ternary complex of two monoclonal antibodies and an antigen form a sandwich. Furthermore, the court did not explain how this art, by itself or in combination with any of the other art, suggests the claimed subject matter and thus why that combination would have been obvious. We are of the opinion that it does not.

The district court correctly found that the use of polyclonal antibodies in sandwich assays was well known. The Jeong patent discloses the use of polyclonal antibodies in a simultaneous sandwich assay, with no suggestion that monoclonal antibodies be so used. It is prior art by virtue of § 102(e), application for the patent having been filed September 5, 1978, its effective date as a reference. The Piasio patent, disclosing a reverse sandwich assay using polyclonal antibodies, and Schurrs, disclosing a forward sandwich assay using the same, both § 102(a) prior art, are likewise devoid of any suggestion that monoclonal antibodies can be used in a similar fashion.

3. The Oi/Herzenberg Work and the Frankel Article

Clearly, the most pertinent items of prior art not cited by the examiner are the Oi/Herzenberg work, as described in section A, 3, *supra*, and the Frankel article. As stated in the discussion of Prior Invention of Another (section III, 2, *supra*), the Oi/Herzenberg work involved mapping epitopes on a known quantity of antigen. It was not concerned with and does not disclose using monoclonal antibodies of at least 10⁸liters/mole affinity. Oi and Herzenberg testified that they did not know the affinity of the antibodies used, and Ciotti testified that nowhere in that work is there mention of monoclonal antibody affinity of at least 10⁸liters/mole. On this basis, we conclude that the Oi/Herzenberg work is qualitatively different than the claimed invention; the former is directed to mapping epitopes on a known quantity of antigen and the latter to determining the "presence or concentration of an antigenic substance in a sample of fluid" We disagree with Monoclonal that these are "essentially the same thing." Furthermore, it is perfectly clear that this work in no way suggests using monoclonal antibodies of the affinity claimed in the '110 patent. It is because of these differences between the Oi/Herzenberg work and the claimed invention that the fact that an antigen was sandwiched between two monoclonal antibodies in the course of Oi's and Herzenberg's work is not sufficient basis to conclude that the claimed invention would have been obvious at the time it was made to a person of ordinary skill in the art.

Likewise, a conclusion that the invention would have been obvious cannot properly be reached when the Oi/Herzenberg work is

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considered in view of the Frankel article. Frankel teaches a method for rapid determination of affinity constants for monoclonal antibodies, some of which clearly have affinities of the order defined by the claims, but does not in any way suggest using two of those antibodies in a sandwich to assay an antigen by forming a ternary complex of labelled antibody, the antigenic substance, and a bound antibody wherein the presence of the antigenic substance is determined by measuring either the amount of labelled antibody bound to a solid carrier or the amount of unreacted labelled antibody. The mere existence of prior art disclosing how to measure the affinity of high affinity monoclonal antibodies is insufficient to support a holding of obviousness. Hybritech's claims define a *process* that *employs* monoclonal antibodies, and does not merely claim antibodies of high affinity. In view of the fact that the Oi/Herzenberg work is not directed to an assay as claimed and does not disclose antibodies of at least 10⁸liters/mole affinity, and further that Frankel fails to suggest using such antibodies in a sandwich assay, the Frankel article does not compensate for the substantial difference between the Oi/Herzenberg work and the claimed subject matter, and therefore those references in combination cannot support a holding of obviousness.

4. Objective Evidence of Nonobviousness

[4] In one part of its opinion the court found that "the commercial success of the kits *may* well be attributed to the business expertise and acumen of the plaintiff's personnel, together with its capital base and marketing abilities" (emphasis ours) and later that "[w]here commercial success is based on the sudden availability of starting materials, in this instance the availability of monoclonal antibodies as a result of the Kohler and Milstein discovery, business acumen, marketing ability, and capital sources, no causal relationship is proven." (Citation omitted.)

i. Commercial Success: Hybritech's Diagnostic Kits Grabbed a Substantial Market Share

The undisputed evidence is that Hybritech's diagnostic kits had a substantial market impact. The first diagnostic kit sales occurring in mid-1981, sales increased seven million dollars in just over one year, from \$6.9 million in-1983 to an estimated \$14.5 million in 1984; sales in 1980 were nonexistent. Competing with products from industry giants such as Abbott Labs, Hoffman LaRoche, Becton-Dickinson, and Baxter-Travenol, Hybritech's HCG kit became the market leader with roughly twenty-five percent of the market at the expense of market shares of the other companies. Its PAP kit ranks second only to a product sold by Dupont's New England Nuclear, surpassing products from Baxter-Travenol, Abbott, and others. Hybritech's other kits, indisputably embodying the invention claimed in the '110 patent, obtained similar substantial market positions.

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Although the district court did not provide its insights into why commercial success was due to business acumen and not to the merits of the claimed invention, Monoclonal urges in support that it was due to Hybritech's spending disproportionate sums on marketing, 25-30% of income. The undisputed evidence was that expenditures of *mature* companies in this field are between 17 and 32%. Furthermore, the record shows that advertising makes those in the industry -- hospitals, doctors, and clinical laboratories -- aware of the diagnostic kits but does not make these potential users buy them; the products have to work, and there is no evidence that that is not the case here or that the success was not due to the merits of the claimed sandwich assays -- clearly contrary to the district court's finding.

The trial court's finding that the "sudden availability of monoclonals" was the reason for the commercial success of Hybritech's diagnostic kits (Finding 11) is unsupported by the record and clearly erroneous. Monoclonal admits that monoclonal antibodies were available in the United States in 1978, and the evidence clearly reflects that. Thus, at least *three years* passed between the time monoclonal antibodies were available in adequate supply and the time Hybritech began selling its kits. Especially in the fast-moving biotechnology field, as the evidence shows, that is anything but sudden availability.

ii. *Unexpected Advantages*

Hybritech points to the testimony of three witnesses skilled in the diagnostic field who state that, based on tests done in their laboratories as a result of real-world comparisons in the normal course of research, the diagnostic kits that embody the '110 invention unexpectedly solved longstanding problems. Dr. Hussa, the head of a large referral laboratory and a world-wide consultant, testified that until Hybritech introduced its kits, he and others were very skeptical and had almost exclusively used competitive assays with a radioactive tracer (RIAs).⁵ In relation to an HCG Hybritech

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kit, he testified that he had first thought that the Hybritech HCG kit would not give accurate results for low antigen concentrations because that condition is indicated in the Hybritech kit by a low radioactivity reading, a reading difficult to differentiate from control samples containing no antigen. He also stated that in the past, RIA kits falsely detected HCG in nonpregnant women, a condition which would indicate cancer and surgery. He stated that when he employed the Hybritech HCG kit in such instances it demonstrated, correctly and absent any difficulty interpreting the data, that no HCG was present.

⁵ Monoclonal's expert Blakemore testified that of 425 assays on the market in 1979 less than 1% were sandwich assays. Today, sandwich assays constitute the majority of all assays sold.

The record also shows that Blakemore, who testified extensively for Monoclonal that the claimed invention would have been obvious, never used monoclonal antibodies in sandwich assays at Cetus before 1980. Additionally, she did not even mention them in the Jeong patent, of which she was a coinventor, which issued January 13, 1981, long after the beginning of Hybritech's work in this area in 1979.

Dr. Blethen, an M.D. holding a Ph.D. in biochemistry, testified that she did not think that the Hybritech HGH kit, for detecting growth hormone in children, would offer any advantage, but she determined that it detected HGH deficiencies in children where conventional RIAs failed to do so. She also stated that the kit does not give false positive readings as do conventional RIA kits, an opinion shared by Dr. Hussa. A third witness, Dr. Herschman, who holds a master's degree in chemistry, testified that he spent years working on the development of an assay that would determine the presence of TSH (thyroid stimulating hormone) with greater sensitivity. He succeeded but discovered that the Hybritech TSH kit had the same sensitivity, the test being performed in four hours rather than the three days his kit required.

Having considered the evidence of nonobviousness required by § 103 and *Graham*, supra, we hold, as a matter of law, that the claimed subject matter of the '110 patent would not have been obvious to one of ordinary skill in the art at the time the invention was made and therefore reverse the court's judgment to the contrary. The large number of references, as a whole, relied upon by the district court to show obviousness, about twenty in number, skirt all around but do not as a whole suggest the claimed invention, which they must, to overcome the presumed validity, *Lindemann*, 730 F.2d at 1462, 221 USPQ at 488, as a whole. See 35 USC 103; *Jones v. Hardy*, 727 F.2d 1524, 1529, 220 USPQ 1021, 1024 (Fed.Cir. 1984). Focusing on the obviousness of substitutions and differences instead of on the invention as a whole, as the district court did in frequently describing the claimed invention as the mere substitution of monoclonal for polyclonal antibodies in a sandwich assay, was a legally improper way to simplify the difficult determination of obviousness. See generally *Hodosh v. Block Drug Co*, 786 F.2d 1136, 229 USPQ 182 (Fed.Cir. 1986).⁶

⁶ It bears repeating that it is crucial that counsel set forth the law accurately. More particularly, it is the duty of counsel to impart to the judge that the obviousness question properly is whether the *claimed invention as a whole would have been* obvious to one of *ordinary skill in the art at the time the invention was made*, and that the district court must *expressly* make the three factual determinations required by *Graham* and consider objective evidence of obviousness *before* the legal conclusion of obviousness *vel non* is made. Submitting to the court language like "any differences . . . would have been obvious," as was done here, violates the axiom that the question is not whether the differences would have been obvious but the claimed invention *as a whole*. Furthermore, arguing that "it would be obvious" rather than that it would *have been* obvious shifts the court's focus to the wrong period of time, namely to a time long after the invention was made, in which, more likely than not, the prior art and the level of ordinary skill in the art are more advanced. See 35 USC 103.

With respect to the objective indicia of nonobviousness, while there is evidence that marketing and financing played a role in the success of Hybritech's kits, as they do with any product, it is clear to us on the entire record that the commercial success here was due to the merits of the claimed invention. It cannot be *argued* on this record that Hybritech's success would have been as great and as prolonged as admittedly it has been if that success were not due to the merits of the invention. The evidence is that these kits compete successfully with numerous others for the trust of persons who have to make fast, accurate, and safe diagnoses. This is not the kind of merchandise that can be sold by advertising hyperbole.

V. Enablement, Best Mode, and Definiteness Under § 112

The section 112 defense appears to have been an afterthought of both Monoclonal, who briefly but unsuccessfully attempts to defend this utterly baseless determination, and of the district court which adopted the defense from Monoclonal's pretrial papers apparently without knowledge of the applicable law, to highlight, as it stated at trial, that it was part of its job to see that "whoever wins wins all the way or whoever loses loses all the way." Taken as a whole, the court's comments on § 112 -- split into two parts, one from Monoclonal's pretrial brief and the other from the adopted pretrial

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findings and conclusions -- are internally inconsistent. The opinion states that the patent fails to disclose how (1) to make monoclonal antibodies; (2) to screen for proper monoclonal antibodies; and (3) to measure monoclonal antibody affinity and therefore the specification is nonenabling and does not satisfy the best mode requirement, and the claims are indefinite. We discuss each of these in turn.

1. Enablement

Enablement is a legal determination of whether a patent enables one skilled in the art to make and use

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the claimed invention, *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 960, 220 USPQ 592, 599 (Fed.Cir. 1983), is not precluded even if some experimentation is necessary, although the amount of experimentation needed must not be unduly extensive, *Atlas Powder Co. v. E.I. Du Pont De Nemours & Co.*, 750 F.2d 1569, 1576, 224 USPQ 409, 413 (Fed.Cir. 1984), and is determined as of the filing date of the patent application, which was August 4, 1980. See *W.L. Gore and Associates v. Garlock, Inc.*, 721 F.2d 1540, 1556, 220 USPQ 303, 315 (Fed.Cir. 1983). Furthermore, a patent need not teach, and preferably omits, what is well known in the art. *Lindemann*, 730 F.2d at 1463, 221 USPQ at 489.

The record fully supports the '110 patent's statement that

The monoclonal antibodies used for the present invention are obtained by the [hybridoma] process discussed by Milstein and Kohler. . . . The details of this process are well known and not repeated here.

The district court itself stated that the "method for producing monoclonal antibodies in vitro was well known prior to the alleged invention of the '110 patent," and used the "sudden availability of monoclonal antibodies" produced by the Kohler and Milstein discovery to support, albeit erroneously, its finding of a lack of nexus between the merits of the claimed invention and its commercial success. The court then about-faced and held the '110 patent deficient because it fails to teach how to make monoclonal antibodies.

With respect to screening, the only permissible view of the evidence is that screening methods used to identify the necessary characteristics, including affinity, of the monoclonal antibodies used in the invention were known in the art and that the '110 patent contemplated one of those. At trial, Monoclonal's counsel stated "it is a procedure that was known in '78." In similar fashion, the district court held that the claimed subject matter would have been obvious in part because the "existence of monoclonal antibodies *having the affinity constants claimed in the patent was well known* prior to the alleged invention . . ." [Emphasis ours.] Furthermore, there was not a shred of evidence that undue experimentation was required by those skilled in the art to practice the invention. We hold as a matter of law that the '110 patent disclosure is enabling.

2. Best Mode

"The specification . . . shall set forth the best mode contemplated by the inventor of carrying out his invention." 35 USC 112. Because not complying with the best mode requirement amounts to concealing the preferred mode contemplated by the applicant at the time of filing, in order to find that the best mode requirement is not satisfied, it must be shown that the applicant knew of and concealed a better mode than he disclosed. *DeGeorge v. Bernier*, 768 F.2d 1318, 1324, 226 USPQ 758, 763 (Fed.Cir. 1985) (quoting with approval *In re Sherwood*, 613 F.2d 809, 204 USPQ 537 (CCPA 1980)). The only evidence even colorably relating to concealment is testimony by various Hybritech employees that sophisticated, competent people perform the screening and that the screening process is labor-intensive and time-consuming. It is not plausible that this evidence amounts to proof of concealment of a best mode for screening or producing monoclonal antibodies for use in the claimed '110 process, and therefore we are of the firm conviction that the district court's finding that the best mode requirement was not satisfied is clearly erroneous.

3. Indefiniteness

[5] The basis of the district court's holding that the claims are indefinite is that "they do not disclose how infringement may be avoided because antibody affinity cannot be estimated with any consistency." (Conclusion 6.) Even if the district court's finding in support of this holding -- that "there is no standard set of experimental conditions which are used to estimate affinities" -- is accurate, under the law pertaining to indefiniteness -- "if the claims, read in light of the specification, reasonably apprise those skilled in the art both of the utilization and scope of the invention, and if the language is as precise as the subject matter permits, the courts can demand no more," *Shatterproof Glass Corp. v. Libbey Owens Ford Co.*, 758 F.2d

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613, 624, 225 USPQ 634, 641 (Fed.Cir. 1985) -- the claims clearly are definite. The evidence of record indisputably shows that calculating affinity was known in the art at the time of filing, and

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notwithstanding the fact that those calculations are not precise, or "standard," the claims, read in light of the specification, reasonably apprise those skilled in the art and are as precise as the subject matter permits. As a matter of law, no court can demand more.

VI. *Motions*

Monoclonal's motion to strike Appendices A and B of Hybritech's reply brief as being beyond the page limit applicable to reply briefs is granted as to Appendix A but denied as to Appendix B, the latter having been helpful in culling the often non-supportive citations to the record by Monoclonal.

Hybritech's motion to supplement the record with a Monoclonal advertisement not considered at trial is denied. Any adverse impact that the disposition of these two motions has upon either party is more than outweighed by this court's patience with the seemingly endless flow of post-argument argumentative papers.

VII. *Conclusion*

The judgment of the district court holding the patent in suit invalid is reversed in all respects, and the case is remanded for a determination of the issue of infringement which the court held was moot.

REVERSED AND REMANDED

- End of Case -

Source: USPQ, 2d Series (1986 - Present) > U.S. Court of Appeals, Federal Circuit > In re Gorman, 18 USPQ2d 1885 (Fed. Cir. 1991)

In re Gorman, 18 USPQ2d 1885 (Fed. Cir. 1991)

18 USPQ2d 1885

In re Gorman

U.S. Court of Appeals Federal Circuit

No. 90-1362

Decided May 13, 1991

933 F2d 982

Headnotes

PATENTS

[1] Patentability/Validity - Obviousness - Combining references (► 115.0905)

Patent and Trademark Office's reliance on teachings of large number of references in rejecting patent application for obviousness does not, without more, weigh against holding of obviousness on appeal, since criterion is not number of references, but whether references are in fields which are same as or analogous to field of invention, and whether their teachings would, taken as whole, have made invention obvious to person skilled in that field.

[2] Patentability/Validity - Construction of claims (► 115.03)

Patentability/Validity - Obviousness - In general (► 115.0901)

Claim which describes features of invention in great detail is nevertheless obvious in view of prior art, since claim that is narrowly and specifically drawn must still meet requirements of 35 USC 103, and details listed in claim are shown in references and thus do not contribute to unobviousness.

[3] Patentability/Validity - Obviousness - Relevant prior art - Particular inventions (► 115.0903.03)

Patentability/Validity - Obviousness - Combining references (► 115.0905)

Application claim for candy sucker on stick, molded in elastomeric mold in shape of human thumb, is obvious in view of prior art, since all elements of claim, including molded lollipop having chewing gum base plug, with elastomeric mold serving as product wrapper, and candy in shape of human thumb, are shown in prior art references in various subcombinations, used in same manner and for same purpose as in claimed invention.

Case History and Disposition

Page 1886

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of Jeffrey B. Gorman and Marilyn Katz, serial no. 06/882,480 (composite food product). From decision of Board of Patent Appeals and Interferences upholding examiner's rejection of all claims

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in application, applicants appeal. Affirmed.

Attorneys

Thomas W. Tolpin, Highland Park, Ill., for appellant.

Teddy S. Gron, associate solicitor (Fred E. McKelvey, solicitor, with him on brief), for appellee.

Judge

Before Rich, Newman, and Rader, circuit judges.

Opinion Text

Opinion By:

Newman, J.

Jeffrey B. Gorman and Marilyn Katz (hereinafter "Gorman") appeal the decision of the United States Patent and Trademark Office, Board of Patent Appeals and Interferences (the "Board") denying patentability to all the claims of Gorman's patent application Serial No. 06/882,480, entitled "Composite Food Product." We affirm.

The Invention

The claimed invention is a composite candy sucker on a stick, molded in an elastomeric mold in the shape of a human thumb. During the manufacturing process liquid candy is poured into the mold, and an edible plug of bubble or chewing gum or chocolate or food-grade wax is poured into the mold after the candy has hardened, serving as a seal for the end portion of the candy. A paper or plastic disc abuts and covers the plug. The mold serves as a cover that can be removed from the candy by means of protruding flanges. The cover is described as a "toy and novelty item".

Figure 1 shows the invention in the form in which it is marketed. Figure 2 shows the cover partially removed to reveal the candy portion (12) and the chewable or edible plug (58):

The claims describe the product in detail, as is apparent from claim 16, the claim pressed by Gorman in this appeal:

16. A composite food product, comprising:

a candy core, said candy core being in a generally liquified form when formulated, heated, blended and poured into a mold and in a substantially thumb-shaped hardened form when cooled and removed from said mold;

said thumb-shaped hardened form comprising said candy core positioned along a vertical axis and comprising a rigid joint-shaped portion, a rigid upper portion extending upwardly from said rigid joint-shaped portion along said vertical axis, and a rigid lower portion extending downwardly from said rigid joint-shaped portion along said vertical axis, said upper portion having a rigid finger nail-shaped portion with an upper rigid tip providing a rigid top end of said thumb-shaped hardened form and a rigid convex back extending rearwardly and downwardly from said rigid tip, and said rigid lower

portion having a rigid bottom end and defining a recessed opening comprising a handle-receiving socket about said vertical axis;

a removable resilient shell comprising a substantially thumb-shaped, elastomeric material selected from the group consisting of rubber and flexible plastic, said shell providing

a mold for receiving and molding said liquified candy form,

a removable outer protective cover positioned about and covering said hardened form comprising said candy core, and

a toy and novelty item for placement upon the thumb of the user when removed from said hardened form comprising said candy core;

said thumb-shaped elastomeric material comprising said removable resilient shell comprising a flexible joint-shaped portion, a flexible upper portion extending upwardly from said flexible joint-shaped portion along said vertical axis, and a flexible lower portion extending downwardly from said flexible joint-shaped portion along said vertical axis, said upper portion having a flexible finger nail-shaped portion with an upper flexible tip providing a flexible top end of said shell and a flexible convex back extending rearwardly and downwardly from said flexible tip, and said flexible lower portion having an enlarged open ended diverging base, said base having a larger circumference and transverse cross-sectional area than other portions of said shell and providing the bottom of said shell, said open ended base defining a plug-receiving chamber and an access opening for entrance of said liquified form and discharge of said hardened candy form, and a set of substantially symmetrical arcuate lobes extending radially outwardly from said base, said lobes being circumferentially spaced from each other and providing manually grippable flange portions to facilitate manual removal of said shell from said core;

a plug positioned in said plug-receiving chamber adjacent said bottom of said shell, said plug abutting against the bottom of said core and providing a cap for substantially plugging and sealing the open end of said mold and cover to help enclose said candy core, and said plug comprising a food grade material selected from the group consisting of bubble gum, chewing gum, chocolate, and food grade wax;

a handle having a connecting portion connected to said plug and said candy core and positioned in said plug-receiving opening and having a manually grippable handle portion extending downward from said connecting portion along said vertical axis; and

a substantially planar annular disk for abuttingly engaging and removably seating against said base and said lobes adjacent said plug, said disk defining a central axial hole for slidably receiving said handle portion and having an outer edge with a maximum span larger than said access opening but less than the maximum diameter of said symmetrical set of lobes to substantially minimize the interference with manually gripping of said manual grippable flange portions of said lobes, said disk being of a material selected from the group consisting of paper, paperboard, and plastic, and providing a removable closure member and seal for substantially closing said access opening and sealing said plug and said candy core within said shell.

The claims were rejected in view of thirteen references. The primary references, patents to Siciliano, Copeman, and Pooler, show ice cream or candy molded in a plastic, rubber or elastomeric mold. In Siciliano and Copeman the mold also serves as the product wrapper. In Siciliano the ice cream is poured into the mold, a stick is inserted, the ice cream is hardened, and a cardboard cover seals the area between the stick and the elastomeric wrapper. Copeman and Kuhlke show candy lollipops molded in elastomeric molds. Copeman states that the mold may take "varying shapes, such as in the form of fruit, or animals" and Kuhlke discusses the desirability of sealing candy from the outside air. In Siciliano, Copeman and Kuhlke, the mold is peeled from the confection prior to use.

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The two Nolte patents teach that gripping flanges may be placed on an ice cream wrap

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per to facilitate removal. Ahern and Knaust each show a disc-shaped seal or cover for a frozen confection. Ahern shows the cover in conjunction with ice cream on a stick.

Harris shows a hollow thumb-shaped lollipop into which the thumb is inserted, and Craddock shows a thumb-shaped confection supported on a disc-shaped handle; in both cases without the other elements shown by Gorman. Fulkerson shows a candy coating surrounding a block of ice cream, and a candy plug for retaining liquid syrup inside a cavity in the ice cream. Webster shows chewing gum entirely enclosing a liquid syrup product. Spiegel shows a chocolate layer having an alcohol diffusion barrier to plug the end of a plastic container of liqueur. Fulkerson, Webster and Spiegel all suggest the greater appeal to consumers of providing two different components in the same confection.

The Board found that all of the features of Gorman's product were known to the art, and that various combinations of these elements existed in known similar structures. The Board concluded that the applicant's claimed combination was suggested by and would have been obvious in light of the references.

Discussion

A

Each element of the Gorman claims is in the prior art, separately or in sub-combination. Gorman argues that when it is necessary to combine the teachings of a large number of references in order to support a rejection for obviousness under 35 U.S.C. § 103, this of itself weighs against a holding of obviousness.

[1] The criterion, however, is not the number of references, but what they would have meant to a person of ordinary skill in the field of the invention. In *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1383, 231 USPQ 81, 93 (Fed.Cir. 1986), cert. denied, 480 U.S. 947 (1987), the court held that a combination of about twenty references that "skirt[ed] all around" the claimed invention did not show obviousness. In other instances, on other facts, we have upheld reliance on a large number of references to show obviousness. Compare *In re Miller*, 159 F.2d 756, 758-58, 72 USPQ 512, 514-15 (CCPA 1947) (rejecting argument that the need for eight references for rejection supported patentability) with *Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 1149, 219 USPQ 857, 860 (Fed.Cir. 1983) (where teachings relied upon to show obviousness were repeated in a number of references, the conclusion of obviousness was strengthened). See also, e.g., *In re Troiel*, 274 F.2d 944, 947, 124 USPQ 502, 504 (CCPA 1960) (rejecting appellant's argument that combining a large number of references to show obviousness was "farfetched and illogical").

Determination of whether a new combination of known elements would have been obvious to one of ordinary skill depends on various facts, including whether the elements exist in "analogous art", that is, art that is reasonably pertinent to the problem with which the inventor is concerned. *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed.Cir. 1986). When the references are all in the same or analogous fields, knowledge thereof by the hypothetical person of ordinary skill is presumed, *In re Sernaker*, 702 F.2d 989, 994, 217 USPQ 1, 5 (Fed.Cir. 1983), and the test is whether the teachings of the prior art, taken as a whole, would have made obvious the claimed invention. See *In re Young*, 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed.Cir. 1991).

When it is necessary to select elements of various teachings in order to form the claimed invention, we ascertain whether there is any suggestion or motivation in the prior art to make the selection made by the applicant. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed.Cir. 1985). "Obviousness can not be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination." *In re Bond*, 910

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F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed.Cir. 1990) (quoting *Carella v. Starlight Archery and Pro Line Co.*, 804 F.2d 135, 140, 231 USPQ 644, 647 (Fed.Cir. 1986)).

The extent to which such suggestion must be explicit in, or may be fairly inferred from, the references, is decided on the facts of each case, in light of the prior art and its relationship to the applicant's invention. As in all determinations under 35 U.S.C. § 103, the decisionmaker must bring judgment to bear. It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps. *Interconnect Planning*, 774 F.2d at 1143, 227 USPQ at 551. The references themselves must provide some teaching whereby the applicant's combination would have been obvious.

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B

Gorman argues that the references showing ice cream in a mold or wrapper on a stick and the references showing candy in a mold or wrapper on a stick are not analogous, for they require different conditions of production. However, the Copeman reference shows the close relationship of these arts, stating that his elastomeric mold may be used for "frozen confections and other solid confections". We conclude that the ice cream on a stick and candy on a stick arts are analogous, and that the Siciliano, Copeman, Pooler, and Kuhlke references show or suggest Gorman's candy on a stick and covered with an elastomeric mold, for which the thumb-shape is shown by Harris or Craddock.

The suggestion of providing a layer of chewing gum, chocolate or the like, surrounding the candy core in the area not covered by the mold, to seal the candy and provide a second food product, is provided by Fulkerson, Webster, or Spiegel. The paper disc adjacent the base of the candy structure is shown in Ahern and Knaust. Harris and Craddock both show thumb-shaped candy. Gorman argues that the prior art does not suggest using the thumb-shaped cover as a toy after the candy is removed. However, Copeman states that his rubber mold may be used as a "toy balloon" after the candy is removed. Gorman argues that Craddock teaches away from the claimed invention because of Craddock's admonition that lollipops on sticks are dangerous to children. However, candy on a stick is too well known for this caution to contribute to unobviousness.

[2] Claim 16 recites details such as a "joint-shaped portion", a "finger nail portion", an "upper portion", a "lower portion" and a "convex back", as descriptive of the thumb shape. Such details are shown in the references and do not contribute to unobviousness. A claim that is narrowly and specifically drawn must nevertheless meet the requirements of § 103:

The mere fact that a claim recites in detail all of the features of an invention (i.e., is a "picture claim") is never, in itself, justification for the allowance of such a claim.

Manual of Patent Examining Procedure, § 706 (Rev. 6, Oct. 1987) at p. 700-6; *In re Romito*, 289 F.2d 518, 129 USPQ 359 (CCPA 1961) (rejecting a "picture claim").

[3] Applying the principles of *Graham v. John Deere & Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), we discern all of the elements of claim 16, used in substantially the same manner, in devices in the same field of endeavor. The various elements Gorman combined: the molded lollipop with a chewing gum plug, with the mold serving as the product wrapper; and candy in the shape of a thumb; are all shown in the cited references in various sub-combinations, used in the same way, for the same purpose as in the claimed invention. The Board did not, as Gorman argues, pick and choose among isolated and inapplicable disclosures in the prior art. Rather, the claim elements appear in the prior art in the same configurations, serving the same functions, to achieve the results suggested in prior art. *In re Sernaker*, 702 F.2d at 994, 217 USPQ at 5. The large number of cited references does not negate the obviousness of the combination, for the prior art uses the various elements for the same purposes as they are used by

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appellants, making the claimed invention as a whole obvious in terms of 35 U.S.C. § 103.

The Board's decision is *AFFIRMED*.

- End of Case -

Source: USPQ, 1st Series (1929 - 1986) > U.S. Court of Appeals, Federal Circuit > In re Gulack, 217 USPQ 401 (Fed. Cir. 1983)

In re Gulack, 217 USPQ 401 (Fed. Cir. 1983)
217 USPQ 401
In re Gulack
U.S. Court of Appeals Federal Circuit
No. 82-580
Decided March 30, 1983
703 F2d 1381

Headnotes

PATENTS

[1] Patentability — Anticipation — In general (► 51.201)

Patentability — Invention — In general (► 51.501)

Patentability — Subject matter for patent monopoly — Printed matter (► 51.611)

Differences between invention and prior art cited against it cannot be ignored merely because those differences reside in content of printed matter; "printed matter rejection" under Section 103 stands on questionable legal and logical footing; standing alone, description of element of invention as printed matter tells nothing about differences between invention and prior art or about whether that invention was suggested by prior art; printed matter rejection is based on case law antedating 1952 Patent Act, employing point of novelty approach; 1952 Act legislatively revised that approach through its requirement that claim be viewed as whole in determining obviousness; under Section 103, Board of Appeals cannot dissect claim, excise printed matter from it, and declare remaining portion of mutilated claim to be unpatentable; claim must read as whole.

[2] Patentability — Anticipation — In general (► 51.201)

Patentability — Invention — In general (► 51.501)

Patentability — Subject matter for patent monopoly — Printed matter (► 51.611)

Printed matter that is not functionally related to substrate does not distinguish invention from prior art in terms of patentability; although printed matter must be considered, in that situation it may not be entitled to patentable weight.

[3] Patentability — Anticipation — In general (► 51.201)

Patentability — Invention — In general (► 51.501)

Patentability — Subject matter for patent monopoly — Printed matter (► 51.611)

Functional relationship between printed matter and substrate of precise type found in In re Miller, 164 USPQ 46, — to size or type of substrate, or conveying information about substrate — is not required; what is required is existence of differences between appealed claims and prior art sufficient to establish patentability; bare presence or absence of specific functional relationship, without further analysis, is not dispositive of obviousness; rather, critical question is whether there exists any new and unobvious

functional relationship between printed matter and substrate.

Particular Patents

Particular patents —Mathematical Device

Gulack, Educational and Recreational Mathematical Device in the Form of a Band, Ring or Concentric Rings, rejection of claims 1-4 and 6 *reversed*.

Case History and Disposition

Page 401

Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of Max A. Gulack, Serial No. 935,183, filed Aug. 18, 1978. From decision rejecting claims 1-4 and 6, applicant appeals. Reversed; Friedman, Circuit Judge, dissenting with opinion.

Attorneys

C. Bruce Hamburg, New York, N.Y., for appellant.

John W. Dewhirst (Joseph F. Nakamura and Fred E. McKelvey, on the brief) for U.S. Patent and Trademark Office.

Judge

Before Friedman, Baldwin, and Smith, Circuit Judges.

Opinion Text

Opinion By:

Smith, Circuit Judge.

This is an appeal from the decision of the U.S. Patent and Trademark Office Board of Appeals sustaining the rejection under 35 U.S.C. § 103 of claims 1-4 and 6 of application serial No. 93,183, filed August 18, 1978, entitled "Educational and Recreational Mathematical Device in the Form of a Band, Ring or Concentric Rings." We reverse.

I.

The stated object of the disclosed invention is to exploit certain arithmetic properties of all prime numbers larger than 5, P ,¹ to create the semblance of magic or to educate

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with respect to intriguing aspects of number theory.

¹ The variable P is defined in the specification as any prime number (an integer not divisible without remainder by any number except itself and unity) greater than 5. E.g., 7, 11, 13, etc.

A.

The physical configuration of the invention is extremely simple. The appealed claims recite three key elements: (1) a *band*, ring, or set of concentric rings; (2) a plurality of individual *digits* imprinted on the band or ring at regularly spaced intervals; and (3) an *algorithm* by which the appropriate digits are developed.

The band ²serves two functions: it supports the sequence of digits and it presents the digits as an endless sequence with no discrete beginning or end. The band is preferably an endless loop of paper, fabric, or plastic material. Specific embodiments of the invention set forth in the specification and appealed claims include a belt, hatband, headband, skullcap border, necklace, ring, table edge, household device or utensil, jewelry, and other artifacts.

² As stated by appellant in his specification band is intended to mean a band, ring, or set of concentric rings.

The digits are integers, generated by the algorithm, and displayed at equal intervals on the outer surface of the band.

The algorithm for generating Q, the sequence of digits imprinted on the band, is also set forth in the specification.

A row of P-1 nines is always divisible by P to give a quotient Q which is an integral number.

Whenever a smaller number of nines is divisible by P to give an integral quotient Q, the number will always consist of some integral fractional part of P-1 nines, which may be designated as P-1/n in which n is an integer greater than 1.

* * * It will be found that the number of digits in the quotient Q will always be P-1 or some integral fraction of P-1. * * * ³

³ To illustrate:

If P = 7 (a prime greater than 5); then Q = 999,999 7; that is Q = 142,857.

If P = 13, the smallest number of nines divisible by 13 that yields an integral quotient is 6, thus Q = 999,999 13 or Q = 76,923.

(Note that in accordance with the specification, (P-1) n = 6, where n = 2, and P = 13.)

The specification describes three qualities of the sequence of digits Q, subject to manipulation for recreational or educational purposes. First, the digits have a "cyclic" nature. ⁴Second, the number of digits in the prime P will fix the maximum number of digits appearing in sequence in Q. For example,

⁴ To simplistically illustrate this cyclic feature:

If $P = 7$;

then $Q = 142,857$, and $2Q = 285,714$.

The sequence of digits is the same in each number; the starting position has merely shifted.

[I]f P is 2 digits, Q or any multiple of Q , or cyclic variation of Q or any multiple of any cyclic variation of Q , if reduced to the original number of digits as aforesaid, will never contain any sequence of any 2 digits more than once. * * *

Finally, the digits of Q are subject to manipulation in accordance with procedures set forth in the specification to produce a series of nines.

Appellant recommends the 180 digit quotient Q (derived from $P = 181$), because its length is sufficient to lend mystical qualities to the manipulation of the band yet short enough to be readily imprinted on the band. The MAGIC RING OF HAYIM, constructed in accordance with the appealed claims, is capable of manipulation as set forth in the specification to perform magic tricks or to display various aspects of number theory.

The appealed claims read as follows:

1. An educational and recreational mathematical device comprising at least one band which is endless or adapted to have ends thereof fastened to form an endless band and a plurality of individual digits imprinted on the band at regularly spaced intervals, the digits when all read consecutively clockwise as a number constituting a quotient obtained by dividing a number constituted of $P-1/n$ nines, in which P is a prime number greater than 5 and n is an integer at least 1, by P and adding to the lefthand end of said quotient any number of zeros necessary to increase the number of digits in said quotient to $P-1/n$, n being so selected that $P-1/n$ nines is the minimum number of nines divisible by P so that said quotient is an integral [sic] number.
2. Device according to claim 1, in which said band is endless.
3. Device according to claim 1, in which said band comprises an article of apparel.
4. Device according to claim 3, in which said band is part of a hat or cap.
6. Device according to claim 1 in which said band is an article of jewelry.

B.

The examiner rejected claims 1-4 and 6 on two grounds: as not directed to statutory subject matter, 35 U.S.C. § 101; and as unpatentable over Wittcoff, ⁵35 U.S.C. § 103. The

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board *reversed* the section 101 rejection, finding that the claims define an article of manufacture covered by 35 U.S.C. § 101.

⁵ E. Wittcoff, U.S. patent No. 2,796,680, issued June 25, 1957, for "Novelty Educational Hats." Wittcoff discloses a hat with an endless band having information printed in areas around both the inside and outside of the band. The hat has an aperture at the base of the crown through which an area of the band is viewed. The band can be rotated to align any specific area of information with the aperture. When an inquiry on the outside of the band is aligned with the aperture, the corresponding answer is viewed through the aperture from the inside of the hat.

In his section 103 rejection, the examiner stated that the appealed claims differed from Wittcoff only in the specific digits printed on the band. The examiner found no relationship between appellant's digits and band except that the band is the surface on which the digits are printed. The examiner cited *In Re Miller*⁶ for the proposition that "[m]ere printed matter can not impart a patentable feature to a claim." Applying *Parker v. Flook*,⁷ the examiner viewed applicant's digits as well known and unable, therefore, to define over Wittcoff.

⁶ *In re Miller*, 418 F.2d 1392, 164 USPQ 46 (CCPA 1969).

⁷ *Parker v. Flook*, 437 U.S. 584, 198 USPQ 193 (1978).

In affirming the 103 rejection, the board found no meaningful relationship between the digits and the band of the type indicated by the court in *Miller*.

Unlike the fact situation in *Miller*, the printed indicia claimed herein [convey] no meaningful information in regard to the substrate [they are] arranged on, [do] not require any size relationship of the substrate, and [do] not require any particular substrate to effectively convey the information. We are convinced that *there is no meaningful functional relationship between appellant's indicia and the claimed endless band*.

* * * In our opinion, the endless loop formed by the hatband with numerical digits printed thereon is the same structure claimed by appellant and *the sole difference is in the content of the printed material*. Accordingly, *there being no functional relationship of the printed material to the substrate, as we have noted above, there is no reasons [sic] to give patentable weight to the content of the printed matter which, by itself, is non-statutory subject matter*.

The rejection of claims 1 to 4 and 6 under 35 USC 103 is sustained. [Emphasis supplied.]

We understand the board as not giving the printed matter patentable weight because the board felt that there is no functional relationship between the printed matter and the substrate. In doing so, we do not interpret the board as holding that the printed matter can be ignored because it, by itself, is non-statutory subject matter. The board cited no authority in analyzing the relevance of the lack of a functional relationship, or of the status of the printed matter as non-statutory subject matter, to its decision not to accord the printed matter patentable weight. Because of the possible ambiguity of the board's articulation of its holding, we feel compelled to clarify the distinction.

[1] Differences between an invention and the prior art cited against it cannot be ignored merely because those differences reside in the content of the printed matter.⁸ Under section 103, the board cannot dissect a claim, excise the printed matter from it, and declare the remaining portion of the mutilated claim to be unpatentable. The claim must be read as a whole.⁹ If the board meant to disregard that

basic principle of claim interpretation, we must reverse the rejection as a matter of law.

⁸ A “printed matter rejection” under § 103 stands on questionable legal and logical footing. Standing alone, the description of an element of the invention as printed matter tells nothing about the differences between the invention and the prior art or about whether that invention was suggested by the prior art. A printed matter rejection is based on case law antedating the 1952 patent act, employing a point of novelty approach. In re Sterling, 70 F.2d 910, 21 USPQ 519 (CCPA 1934). The 1952 act legislatively revised that approach through its requirement that the claim be viewed as a whole in determining obviousness. Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966). The CCPA has considered *all* of the limitations of the claims including the printed matter limitations, in determining whether the invention would have been obvious. See In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974); In re Cavrich, 451 F.2d 1091, 172 USPQ 121 (CCPA 1971). In Royka, 490 F.2d at 985, 180 USPQ at 583, the CCPA, notably weary of reiterating this point, clearly stated that printed matter may well constitute structural limitations upon which patentability can be predicated.

⁹ 35 U.S.C. § 103 (1976) specifically provides that:

“A patent may not be obtained * * * if the differences between the subject matter sought to be patented and the prior art are such that *the subject matter as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. * * * (Emphasis supplied.)

See Graham, 383 U.S. 1, 148 USPQ 459 ; Flook, 437 U.S. at 594 n.16, 198 USPQ at 199 n.16 (noting the § 103 requirement of reading claims as a whole and extending that requirement to § 101); Diamond v. Diehr, 450 U.S. 175, 188, 209 USPQ 1, 9 (1981) (also applying that requirement in a § 101 setting); Royka, 490 F.2d at 985, 180 USPQ at 583.

[2] If, instead, the board sought only to construe and apply Miller within the context of a section 103 rejection, we find no error in the board’s articulation of the law. Where the printed matter is not functionally related to the substrate, the printed matter will not distinguish the invention from the prior art in terms of patentability. ¹⁰ Although the printed matter must be considered, in that situation it may not be entitled to patentable weight. This, apparently, was the board’s conclusion with respect to Gulack’s invention.

¹⁰ Miller, 418 F.2d 1392, 164 USPQ 46 .

However, because we find that the digits of Gulack’s invention are functionally related to the band, and because Wittcoff fails to disclose or suggest the subject matter recited in the appealed claims, considered as a whole, we reverse.

The sole issue is whether the board correctly *affirmed* the rejection of the appealed claims as obvious in view of Wittcoff under 35 U.S.C. § 103.

II.

The board, responding to appellant’s arguments based on In re Miller, ¹¹ found no functional relationship of the type present in Miller.

¹¹ Id.

A.

Miller involved an appeal from the board's affirmance of the rejection of claims drawn to a measuring device for use in fractioning recipes. No statutory ground for the rejection was specified. The rejection in Miller was on the basis that the invention lacked "the required cooperative structural relationship necessary before the printed matter can be given patentable weight."¹²

¹² Id at 1395, 164 USPQ at 48.

The CCPA¹³ responded, stating:¹⁴

¹³ The holdings of the United States Court of Customs and Patent Appeals and of the United States Court of Claims were adopted as precedent in the Court of Appeals for the Federal Circuit in *South Corp. v. United States*, 690 F.2d 1368, 1370, 215 USPQ 657, 658 (Fed.Cir. 1982).

¹⁴ *Miller*, 418 F.2d at 1396, 164 USPQ at 48-49.

[i]t seems to us that what is significant here is not structural but *functional* relationship * * * . * * *

As for the examiner's characterization of the indicia and legend as "unpatentable printed matter," we note that the examiner himself recognizes the fact that printed matter, in an article of manufacture claim, *can* be given "patentable weight." He did so in allowing claims. His characterization of printed matter as "unpatentable" is beside the point; no attempt is here being made to patent printed matter as such. The fact that printed matter *by itself* is not patentable subject matter, because non-statutory, is no reason for ignoring it when the claim is directed to a combination. Here there is a new and unobvious functional relationship between a measuring *receptacle*, volumetric *indicia* thereon indicating volume in a certain ratio to actual volume, and a *legend* indicating the ratio, and in our judgment the appealed claims properly define this relationship. * * * [Emphasis in original.]

The court found that the printed matter of Miller's invention was functionally related to the volume measuring device and *reversed* the rejection.

B.

[3] Similarly, in examining Gulack's invention, we find that a functional relationship does exist between the printed matter and the substrate. A functional relationship of the precise type found by the CCPA in Miller—to size or to type of substrate, or conveying information about substrate—is not required. What is required is the existence of *differences* between the appealed claims and the prior art sufficient to establish patentability. The bare presence or absence of a specific functional relationship, without further analysis, is not dispositive of obviousness. Rather, the critical question is whether there exists any new and unobvious functional relationship between the printed matter and the substrate.¹⁵ With these thoughts in mind we turn now to examine the obviousness of the appealed claims in light of the cited reference,

Wittcoff.

¹⁵ Id. at 1396, 164 USPQ at 49.

III.

Appellant and the board agree that the sole difference between the appealed claims and Wittcoff resides in the content of the printed matter. The board declined, however, to accord that printed matter patentable weight.

Wittcoff discloses the application of printed matter to a band. The printed matter suggested by Wittcoff is data that is to be committed to memory, such as addition, subtraction,

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multiplication, history dates, historical personages, and the like. The data items are independent, bearing no direct relation to the other data entries on Wittcoff's band. The relationship of the Wittcoff data to the band is for purposes of support and display. The data must be imprinted on the band so that the answer to the inquiry displayed on the outer surface of the band is visible when viewed from inside the hat through the aperture. Wittcoff discloses an endless band, yet the areas of printed matter displayed on the Wittcoff band are not arranged in any particular sequence.

The appealed claims, on the other hand, require a particular sequence of digits to be displayed on the outside surface of a band. These digits are related to the band in two ways: (1) the band supports the digits; and (2) there is an endless sequence of digits —each digit residing in a unique position with respect to every other digit in an endless loop. Thus, the digits exploit the endless nature of the band.

The differences between the appealed claims and Wittcoff reside in appellant's particular sequence of digits Q, and in the derivation of that sequence of digits. These features are critical to the invention disclosed by the appealed claims. Wittcoff neither discloses nor suggests either feature.

IV.

We reject the board's conclusion that there is no functional relationship between the printed matter and the substrate of the appealed claims. Such a relationship does exist and it is different from the relationship exhibited by the corresponding elements of the Wittcoff reference. We find no suggestion in the cited reference of appellant's particular sequence of digits Q or of the derivation of that sequence.

Reversed .

Dissenting Opinion Text

Dissent By:

Friedman, Circuit Judge, dissenting.

I would affirm the Board's decision sustaining the rejection of the claimed invention as obvious under section 103.

The appellant's primary claim is for "[a]n educational and recreational mathematical device," namely, an endless band upon which are imprinted numbers in a particular sequence derived from the application of an algorithm. Subordinate claims describe the band as an article of apparel, part of a hat or cap, or an

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article of jewelry.

The algorithm is not patentable and “is treated as though it were a familiar part of the prior art.” *Parker v. Flook*, 437 U.S. 584, 592 (1978). Similarly, the particular numbers produced by an abstract solution of the algorithm cannot themselves be claimed, although the practical application of those numbers may be patentable. See *In re Meyer*, 688 F.2d 789, 215 USPQ 193 (CCPA 1982); *In re Abele*, 684 F.2d 902, 214 USPQ 682 (CCPA 1982). The issue under section 103 is whether, to one of ordinary skill in the art of developing algorithms and applying their product for educational or recreational purposes, it would have been obvious to apply the algorithm by displaying the result of its solution on a continuous band, as the appellant disclosed in his patent application. The Board correctly answered that question affirmatively.

The Wittcoff patent teaches the use of a hatband to display numbers as an “educational or game-playing device.” Although there are differences between the display of numbers in appellant’s invention and their display in Wittcoff, it would have been obvious from Wittcoff for one of ordinary skill in the art who wanted to use the numbers the algorithm produced for appellant’s purposes, to display them on a continuous band. Indeed, one of the appellant’s subordinate claims displays the numbers on a hat or cap.

The display of the numbers on a band or other object that permits them to be shown in a series without a particular beginning or end would have been obvious even without Wittcoff. The numbers can be used for the recreational and educational purposes the appellant claims merely by arranging them in a continuous series. They do not need to be placed on an “endless band” as the appellant claimed. In fact, at oral argument the appellant conceded that the same result his invention accomplishes also could be accomplished by placing the numbers in a continuous series upon a cube or other shape, or even by writing them in a circle upon a flat surface. The precise nature of the object on which the numbers are placed is thus of little importance. The only matter that is of significance—the arrangement of the numbers as a continuous series—would have been obvious to anyone of ordinary skill in the art who knew the algorithm.

In *In re Miller*, 418 F.2d 1392, 164 USPQ 46 (CCPA 1969), as the court points out, the court determined that there was “a new and unobvious functional relationship” between the measuring receptacles and the descriptions and legends on them. In the present case, unlike *Miller*, I do not think that the “functional relationship” between the numbers resulting from the application of the

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algorithm and their display upon the continuous band was new and unobvious.

- End of Case -